Administration Guide

hp StorageWorks NAS 2000s

First Edition(September 2003)

Part Number: 345650-001

This guide provides information on performing the administrative tasks necessary to manage the HP StorageWorks NAS 2000s server. Overview information as well as procedural instructions are included in this guide.

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NAS 2000s Administration Guide
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About This Guide

This administration guide provides information to help administrators:

- Plan the storage configuration
- Setup physical storage
- Manage users and groups
- Manage folders and shares
- Manage a UNIX® file system
- Manage a NetWare file system
- Remotely access the NAS 2000s server

“About this Guide” topics include:

- Overview, page 12
- Conventions, page 12
- Rack Stability, page 14
- Getting Help, page 15

Overview

This section covers the following topics:

- Intended Audience
- Prerequisites

Intended Audience

This book is intended for use by system administrators who are experienced with setting up and managing a network server.

Prerequisites

Before beginning, make sure you consider the items below.

- Knowledge of Microsoft® Windows® NT® or 2000® operating system
- Knowledge of HP hardware
- Location of all documentation shipped with your server

Conventions

Conventions consist of the following:

- Document Conventions
- Text Symbols
- Equipment Symbols

Document Conventions

The document conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	Italics
User input, command and directory names, and system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase monospace font unless they are case sensitive
Variables	*`<monospace, italic font>`*
Website addresses	Sans serif font text: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings:

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

Rack stability protects personnel and equipment.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- In single rack installations, the stabilizing feet are attached to the rack.
- In multiple rack installations, the racks are coupled.
- Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website: http://www.hp.com.

HP Technical Support

Telephone numbers for worldwide technical support are listed on the following HP website: http://www.hp.com/support/. From this website, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product, as well as the latest drivers. Access storage at: http://www.hp.com/country/us/eng/prodserv/storage.html. From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP website for locations and telephone numbers: http://www.hp.com.

System Overview

1

The HP StorageWorks NAS 2000s server can be used in many types of computing environments, from basic Microsoft Windows workgroups to complicated multiprotocol domains using DFS, NFS, FTP, HTTP, and Microsoft SMB. The corresponding varieties of clients that can be serviced include any Windows, UNIX, Linux, Novell, or Macintosh variant.

This chapter provides an overview of these environments and deployments and includes brief descriptions of system user interfaces, applications, and options.

Product Definition and Information

The NAS 2000s is a business class NAS solution that provides reliable performance, manageability, and fault tolerance.

Server Hardware and Software Features

Refer to the *HP StorageWorks NAS 2000s Installation Guide* for a listing of server hardware and software features.

For specific software product recommendations, go to the HP website:

http://h18000.www1.hp.com/products/storageworks/nas/supportedsoftware.html

Product Manageability

The NAS 2000s ships with the following utilities and features that ease the administration tasks associated with managing the system:

- The Rapid Startup Wizard is a user friendly configuration utility that ensures easy configuration.
- The WebUI is a simple, graphical user interface (GUI) that helps with administration tasks.
- Insight Manager is a comprehensive tool designed to be a key component in the systems management environment. It monitors the operations of HP servers, workstations, and clients. Insight Manager provides system administrators more control through comprehensive fault and configuration management, and industry leading remote management.
- The Integrated Lights-Out feature provides remote access, sends alerts, and performs other management functions, even if the operating system of the host server is not responding.

Product Redundancy

The NAS 2000s is specifically designed to perform file serving tasks for networks. Using industry standard components, redundancy of power supplies, NICs, and fans ensures reliability.

Other industry standard features, such as redundant array of independent drives (RAID) and remote manageability, further enhance the overall dependability of the NAS 2000s.

The server contains dual 36.4 GB hard drives preconfigured with the NAS operating system so that the active system volume is mirrored (RAID 1+0) to the second drive. If one of the internal drives fails, the integrity of the system is preserved, because the system will use the copy of the operating system on the remaining healthy drive. The drives in the server are hot-pluggable, so the failed drive can be replaced while the system is running. When the failed drive is replaced, the system automatically uses the version of the operating system on the healthy drive to rebuild the replacement.

The NAS 2000s internal storage server also contains four 146.8 GB hard drives for data storage. The NAS 2000s external storage server ships with four 146.8 GB hard drives in an external storage cabinet connected to the Smart Array 6404 controller. These hard drives are not configured, allowing customizable configuration options. These drives may be configured to RAID levels 0, 1+0, 5, and Advanced Data Guarding (ADG).

Note: RAID 1+0 requires an even number of drives.

The NAS 2000s includes dual power supplies. A power supply can be replaced while the server is running. To ensure redundancy, it is important to connect each power supply to a separate power source. If one power source fails, the server remains operational through the second power source.

Through a seamless, hardware-based, graphical remote console, the Integrated Lights-Out port provides the administrator with full control of the server from a remote location. Using a client browser, the administrator can remotely power up, power down, and operate the console. A built in processor makes the port independent of the server and the operating system.

Product Scalability

The NAS 2000s offers optimized performance for a growing environment. Storage capacity can increase as a business grows without incurring downtime or compromising performance. The internal model ships with four 146.8 GB disk drives, providing 587.2 GB of raw storage. The external NAS 2000s model can support up 27 TB of raw storage capacity. This maximum capacity is achieved by connecting thirteen HP StorageWorks storage enclosures to three Smart Array 4-port controllers and the integrated SCSI array connector. Each storage enclosure supports up to fourteen 146.8 GB hard disks, and the NAS system has four additional SCSI bays, for a total of 186 hard disk drives.

The external NAS 2000s model can support up 27 TB of raw storage capacity. This maximum capacity is achieved by connecting thirteen HP StorageWorks storage enclosures to three Smart Array 4-port controllers and the integrated SCSI array connector. Each storage enclosure supports up to fourteen 146.8 GB hard disks, and the NAS system has four additional internal SCSI bays, for a total of 186 hard disk drives.

Note: Each fully populated HP StorageWorks 4300/4400 Family storage enclosure can contain up to14 hard drives.

Deployment Scenarios

Various deployment scenarios are possible. See the *HP StorageWorks NAS 2000s Installation Guide* for configurations. Typical application of NAS devices include:

- **File server consolidation**

  As businesses continue to expand their information technology (IT) infrastructures, they must find ways to manage larger environments without a corresponding increase in IT staff. Consolidating many servers into a single NAS device decreases the number of points of administration and increases the availability and flexibility of storage space.

- **Multiprotocol environments**

  Some businesses require several types of computing systems to accomplish various tasks. The multiprotocol support of the NAS 2000s allows it to support many types of client computers concurrently.

- **Protocol and platform transitions**

  When a transition between platforms is being planned, the ability of the NAS 2000s to support most file sharing protocols allows companies to continue to invest in file storage space without concerns about obsolescence. For example, an administrator planning a future transition from Windows to Linux can deploy the NAS 2000s with confidence that it can support both CIFS and NFS simultaneously, assuring not only a smooth transition, but also a firm protection of their investment.

- **Remote office deployment**

  Frequently, branch offices and other remote locations lack dedicated IT staff members. An administrator located in a central location can use the WebUI of the NAS 2000s, Microsoft Terminal Services, and other remote administration methods to configure and administer all aspects of the NAS 2000s.

Environment Scenarios

The NAS 2000s is deployed in one of two security modes:

- Workgroup
- Domain (Windows NT Domain or Active Directory Domain)

The NAS 2000s uses standard Windows user and group administration methods in each of these environments. For procedural instructions on managing users and groups, see Chapter 5 of this guide.

Regardless of the deployment, the NAS 2000s integrates easily into multiprotocol environments, supporting a wide variety of clients. The following protocols are supported:

- Distributed File System (DFS)
- Network File System (NFS)
- Hypertext Transfer Protocol (HTTP)
- File Transfer Protocol (FTP)
- Microsoft Server Message Block (SMB)

Workgroup

In a workgroup environment, users and groups are stored and managed separately, on each member server of the workgroup. Workgroups are typical for very small deployments where little or no computing environment planning is required.

Domain

When operating in a Windows NT or Active Directory domain environment, the NAS 2000s is a member of the domain and the domain controller is the repository of all account information. Client machines are also members of the domain and users log on to the domain through their Windows based client machines. The domain controller also administers user accounts and appropriate access levels to resources that are a part of the domain. Additional information about planning for domain environments can be found at:

http://www.microsoft.com/windows2000/technologies/directory/ad/default.asp

The NAS 2000s obtains user account information from the domain controller when deployed in a domain environment. The NAS 2000s itself cannot act as a domain controller, backup domain controller, or the root of an Active Directory tree as these functions are disabled in the operating system.

User Interfaces

There are several user interfaces that administrators can use to access and manage the NAS 2000s. Two of these interfaces are:

- NAS 2000s WebUI
- NAS 2000s Desktop

Each interface contains the same or similar capabilities, but presents them in a different manner. Each of these interfaces are illustrated in the following sections.

NAS 2000s Web-Based User Interface

The WebUI provides for system administration, including user and group management, share management, and local storage management.

Refer to the *HP StorageWorks NAS 2000s Installation Guide* for detailed information on using the Rapid Startup Wizard for initial setup.

To access the WebUI, launch a Web browser and enter the following in the address field:

```
https://<your NAS machine name or IP Address>:3202/
```

The default user name is `Administrator`. The default password is `hpinvent`. Online help for the WebUI is available by clicking the **Help** tab on the primary WebUI screen.

The primary screen of the WebUI is shown in Figure 1.

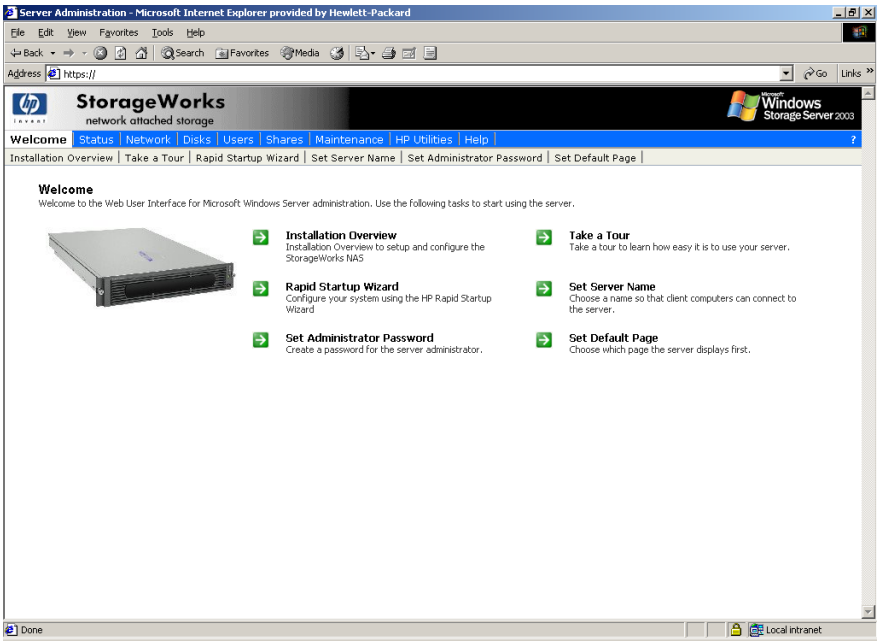

Server Administration - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Installation Overview | Take a Tour | Rapid Startup Wizard | Set Server Name | Set Administrator Password | Set Default Page
Welcome
Welcome to the Web User Interface for Microsoft Windows Server administration. Use the following tasks to start using the server.
Installation Overview
Installation Overview to setup and configure the StorageWorks NAS
Take a Tour
Take a tour to learn how easy it is to use your server.
Rapid Startup Wizard
Configure your system using the HP Rapid Startup Wizard
Set Server Name
Choose a name so that client computers can connect to the server.
Set Administrator Password
Create a password for the server administrator.
Set Default Page
Choose which page the server displays first.
Done
Local intranet

Figure 1: Primary WebUI screen

As shown in Figure 1, the following areas are administered through this interface:

Menu Tabs

Status

The Status option displays alerts generated by the WebUI.

Network

The Network option contains system settings, including system identification, global settings, interfaces settings, administration settings, Telnet settings, and SNMP settings.

Disks

Use this option to manage disks, volumes, disk quotas, and shadow copies.

Users

Use this option to manage local users and groups.

Shares

The administrator creates folders and shares to control access to files. When a share is created, the administrator indicates the protocols that can be supported by that share as well as the users and groups of users that have access. Protocol parameters are entered in this Shares option. See Chapter 6 for additional information.

Maintenance

Maintenance tasks include setting date and time, performing system restarts and shutdowns, viewing audit logs, setting up Email alerts, linking to remote management, and selecting and configuring your UPS.

HP Utilities

Access HP system management utilities such as remote management, enable floppy boot, File and Print Services for Netware, and the HP System Management WebUI.

Help

This option contains help information for the WebUI.

Welcome Screen Contents

Installation Overview

Use to set up and configure the NAS server. This is an online, supplemental guide. A more comprehensive paper document is provided in the country kit that shipped with the server.

Rapid Startup Wizard

Use this utility to enter system setup and configuration information.

Set Administrator Password

Create a password for the server appliance administrator.

Take a Tour

Learn how to use the NAS server.

Set Server Name

Choose a name so that client computers can connect to the server.

Set Default Page

Choose which page the server appliance displays first.

NAS 2000s Desktop

The NAS 2000s desktop can be accessed by:

- Directly connecting a keyboard, mouse, and monitor
- Using the WebUI Maintenance tab and selecting **Remote Desktop**
- Using the Integrated Lights-Out port

Note: When using Remote Desktop to connect to the NAS 2000s desktop do not use the window close feature ( ). Click on **Start/Log Off Administrator** to exit Remote Desktop. See "Improper Closure of Remote Desktop" in Chapter 2.

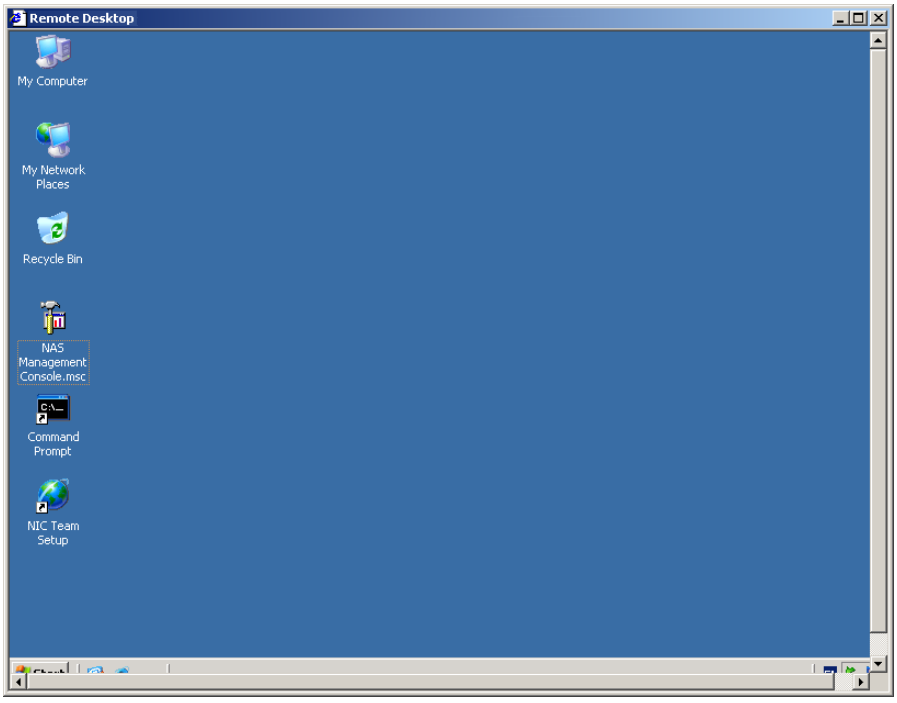


Figure 2: NAS 2000s desktop

The following icons are available from the Desktop:

- NAS Management Console
- NIC Team Setup

NAS Management Console

Click this icon to access the following folders:

- **Core Operating System** is used to manage local users and groups, access performance logs and alerts, and manage the event viewer.
- **Disk System** contains access to the Compaq Array Configuration Utility and local disk management, including a volume list and a graphical view of the disks.
- **File Sharing** contains modules for the configuration of file sharing exports. CIFS/SMB (Windows) and NFS (UNIX) file shares are managed through this folder.
- **System** contains system summary information.

NIC Team Setup

Click this icon to install the HP Network Teaming and Configuration utility. See Chapter 2 for additional information on this feature.

Basic Administrative Procedures and Setup Completion

2

Basic system administration functions are discussed in this chapter.

This chapter also continues the process of setting up the system that was started using the *HP StorageWorks NAS 2000s Installation Guide* by discussing additional setup procedures and options. Further steps can also be viewed online by clicking the **Installation Overview** tab from the primary WebUI screen.

Unless otherwise instructed, all procedures are performed using the NAS Web Based User Interface (WebUI).

Note: The NAS 2000s Desktop can be accessed via a directly connected keyboard, mouse, and monitor through Remote Desktop, or by using an Integrated Lights-Out port.

Basic Administrative Procedures

Basic administrative procedures include:

- Setting the system date and time
- Shutting down or restarting the server
- Viewing and maintaining audit logs
- Using Remote Desktop
- Setting up e-mail alerts
- Changing system network settings

These functions are performed in the **Maintenance** menu of the WebUI.

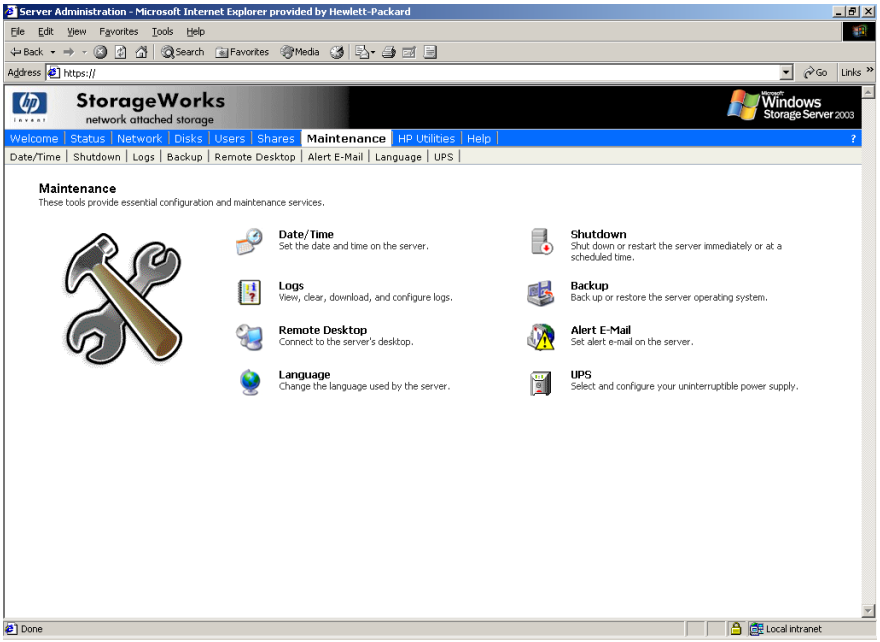

Server Administration - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
Go Links
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Date/Time Shutdown Logs Backup Remote Desktop Alert E-Mail Language UPS
Maintenance
These tools provide essential configuration and maintenance services.
Date/Time
Set the date and time on the server.
Shutdown
Shut down or restart the server immediately or at a scheduled time.
Logs
View, clear, download, and configure logs.
Backup
Back up or restore the server operating system.
Remote Desktop
Connect to the server's desktop.
Alert E-Mail
Set alert e-mail on the server.
Language
Change the language used by the server.
UPS
Select and configure your uninterruptible power supply.
Done
Local intranet

Figure 3: Maintenance menu

Setting the System Date and Time

To change the system date or time:

1. From the WebUI, select **Maintenance** and **Date/Time**. The **Date and Time Settings** dialog box is displayed.
2. Enter the new values and then click **OK**. The **Maintenance** menu is displayed.

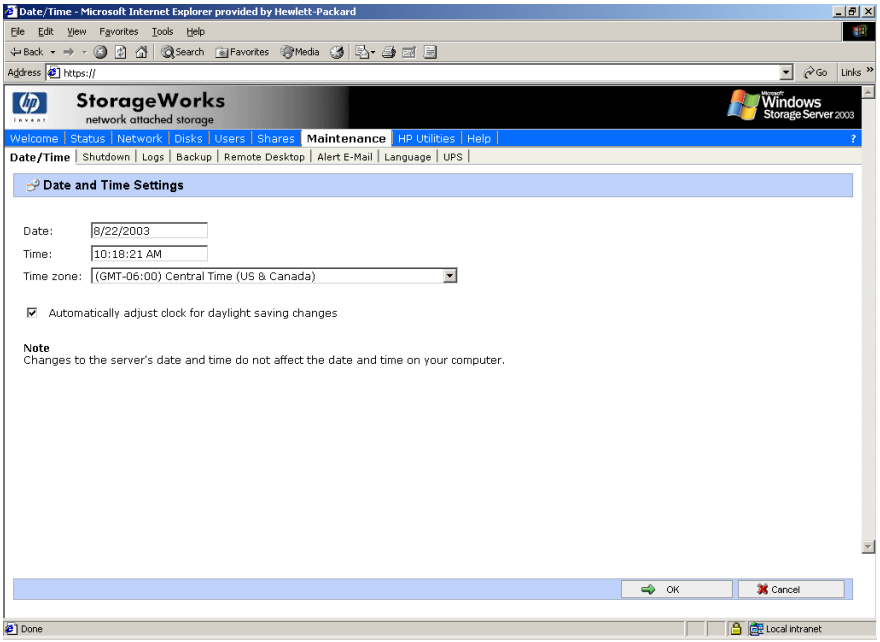

Date/Time - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
Go Links
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Date/Time Shutdown Logs Backup Remote Desktop Alert E-Mail Language UPS
Date and Time Settings
Date: 8/22/2003
Time: 10:18:21 AM
Time zone: (GMT-06:00) Central Time (US & Canada)
Automatically adjust clock for daylight saving changes
Note
Changes to the server's date and time do not affect the date and time on your computer.
OK
Cancel
Done
Local intranet

Figure 4: Date and Time dialog box

Shutting Down or Restarting the Server

Caution: Notify users before powering down the system. Both UNIX and Windows NT users can be drastically affected if they are not prepared for a system power-down.

1. From the NAS 2000s WebUI, select **Maintenance**, **Shutdown**. Several options are displayed: **Restart**, **Shut Down**, and **Scheduled Shutdown**.

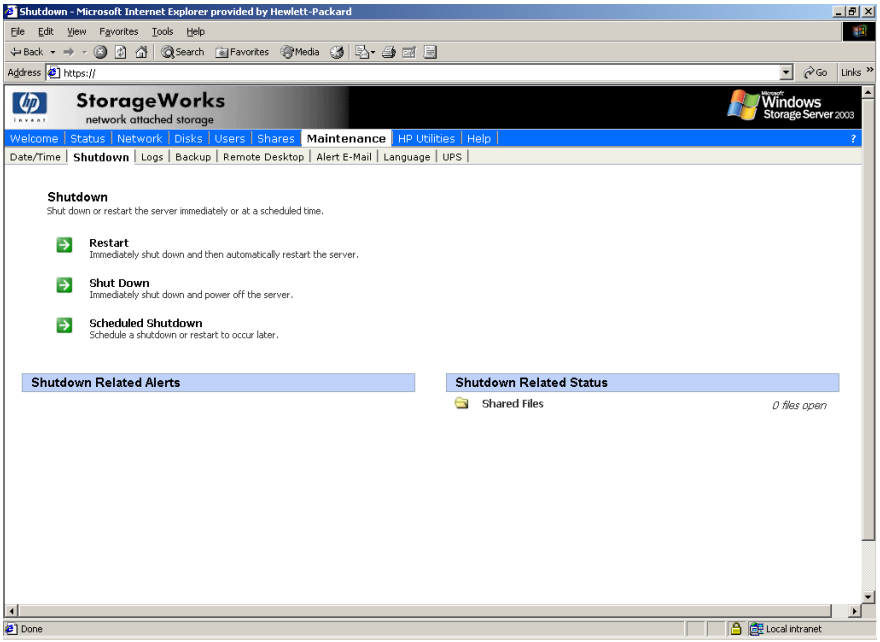

Shutdown - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
Go Links
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Date/Time Shutdown Logs Backup Remote Desktop Alert E-Mail Language UPS
Shutdown
Shut down or restart the server immediately or at a scheduled time.
Restart
Immediately shut down and then automatically restart the server.
Shut Down
Immediately shut down and power off the server.
Scheduled Shutdown
Schedule a shutdown or restart to occur later.
Shutdown Related Alerts
Shutdown Related Status
Shared Files
0 files open
Done
Local intranet

Figure 5: Shutdown menu

   a. To shut down and automatically restart the server, click **Restart**.
   b. To shut down and power off the server, click **Shut Down**.
   c. To schedule a shutdown, click **Scheduled Shutdown**.
2. Regardless of the choice, a confirmation prompt is displayed. After verifying that this is the desired action, click **OK**.

Note: Client computers connected to the server will receive a warning message prior to shutdown. Clients connected via Remote Desktop do not receive any warning.

Viewing and Maintaining Audit Logs

A variety of audit logs are provided on the NAS 2000s. System events are grouped into similar categories, representing the seven different logs.

To access the logs from the WebUI, select **Maintenance**, **Logs**. The **Logs** menu is displayed.

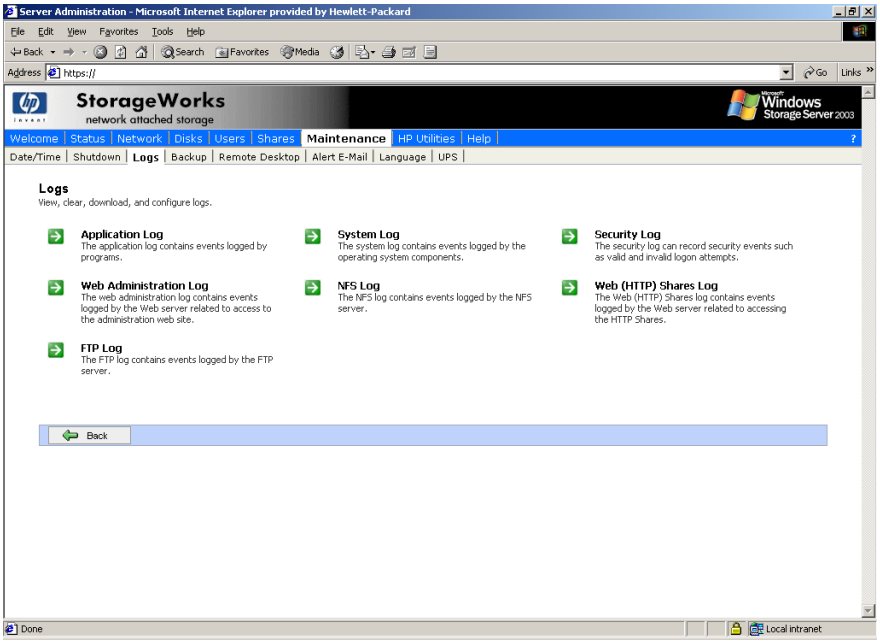

Server Administration - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
Go Links
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Date/Time Shutdown Logs Backup Remote Desktop Alert E-Mail Language UPS
Logs
View, clear, download, and configure logs.
Application Log
The application log contains events logged by programs.
System Log
The system log contains events logged by the operating system components.
Security Log
The security log can record security events such as valid and invalid logon attempts.
Web Administration Log
The web administration log contains events logged by the Web server related to access to the administration web site.
NFS Log
The NFS log contains events logged by the NFS server.
Web (HTTP) Shares Log
The Web (HTTP) Shares log contains events logged by the Web server related to accessing the HTTP Shares.
FTP Log
The FTP log contains events logged by the FTP server.
Back
Done
Local intranet

Figure 6: Logs menu

A variety of logs are available and are listed in Figure 6.

Each log has viewing, clearing, printing, and saving options.

Note: You should not use the WebUI to view log files greater than 2 MB. Select Log properties to adjust the maximum file size, or download the file to view.

Note: NFS logging is disabled by default. Enable NFS logging using the NAS Management Console. NFS stops logging when the log file is full.

Using Remote Desktop

Remote Desktop is provided in the WebUI to allow for additional remote system administration and the use of approved third-party applications. Backup software and antivirus programs are examples of approved applications.

To open a Remote Desktop session from the WebUI, select **Maintenance**, **Remote Desktop**. A Remote Desktop session is opened. Enter the appropriate password to log on to the server.

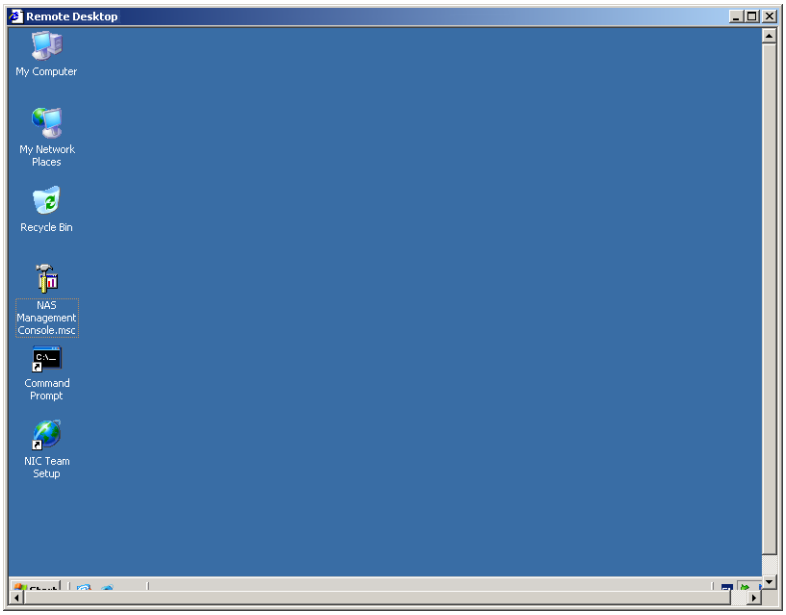


Figure 7: Remote Desktop session

Caution: Two open sessions of Remote Desktop are allowed to operate at the same time. After completing an application do not use the window close feature ( ) to close that session of Remote Desktop. Click **Start/Log Off Administrator** to exit Remote Desktop.

Improper Closure of Remote Desktop

Certain operations such as drive management via ACU can leave the utilities running if the browser is closed versus exiting from the program via the application menu or logging off the Remote Desktop session. In the case of ACU, the drive lights will remain blinking until one of the following occurs:

1. The ACU is accessed again via the link under **Disk** in the Web User Interface and the application is closed properly.
2. The orphaned Remote Desktop session is closed and the orphaned application is closed. The default timeout has been set to 15 minutes but it may require up to 30 minutes for ACU to exit. This value may be adjusted in the **Terminal Services Configuration** option under Administrator Tools, accessed either through the desktop or via a Remote Desktop session.

Other applications may become orphaned in this manner when the Remote Desktop session is exited improperly. A maximum of two Remote Desktop sessions may be used at any given time. Improper exit from a session can result in the sessions becoming consumed. Sessions and processes can be terminated using the **Terminal Services Manager** via **Start >Programs >Administrator Tools**.

Note: The Terminal Services Manager must be accessed via the iLO port or direct attached console.

Setting up E-mail Alerts

E-mail messages are limited to the alerts generated from the WebUI status bar or the WebUI status page, as well as some event log messages. Some alerts, such as the restart of the server, only occur if the WebUI was utilized to initiate the request. For example, a restart initiated using the WebUI will general an e-mail message indicating a restart has occurred. Initiating a restart using the Windows 2000 schedule or Desktop will not. Messaging in the status bar and page is limited to the following areas:

- WebUI Alerts
  - NTBackup backup started
  - NTBackup restore started
  - Defrag started
  - UPS power failure
  - Restart pending
  - Shutdown pending
  - DFS not configured
  - Date and time not configured
  - No certificate
  - Quota management alerts
- Event Log Messages
  - NTBackup Information
  - UPS power failed
  - UPS power restored
  - UPS invalid config
  - UPS system shutdown
  - Quota management alerts

To activate this option:

1. From the WebUI, select **Maintenance**, **Alert E-mail**. The **Set Alert E-Mail** dialog box is displayed.
2. Select **Enable Alert E-mail**.

3. Indicate the types of messages to be sent.
   - Critical alerts
   - Warning alerts
   - Informational alerts
4. Enter the desired e-mail address in the appropriate boxes.
5. After all settings have been entered, click **OK**.

Changing System Network Settings

Network properties are entered and managed from the **Network** menu. Most of these settings are entered as part of the Rapid Startup process. Settings made from this menu include adding the NAS 2000s to a domain.

Online help is available for these settings. Figure 8 is an illustration of the Network settings menu.

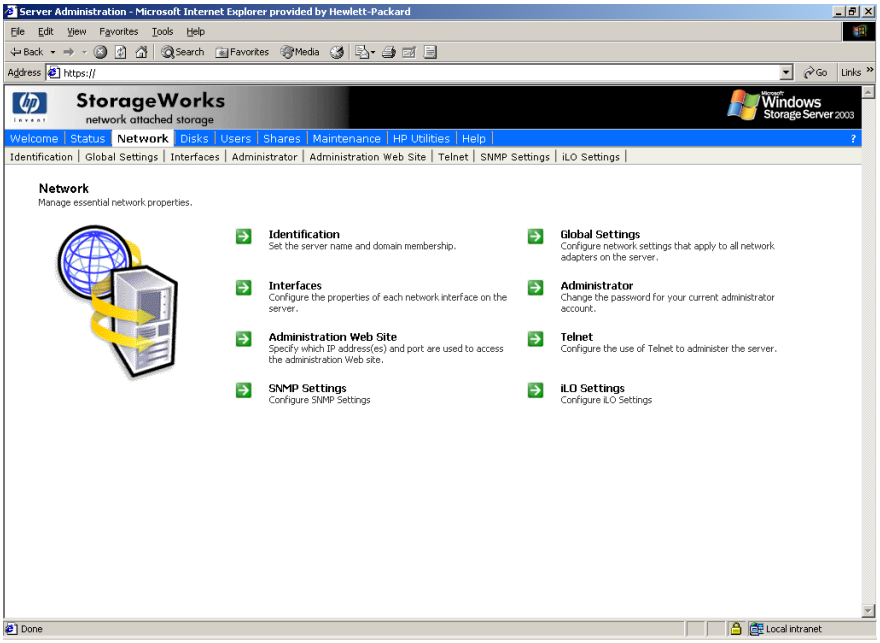

Server Administration - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Identification Global Settings Interfaces Administrator Administration Web Site Telnet SNMP Settings iLO Settings
Network
Manage essential network properties.
Identification
Set the server name and domain membership.
Global Settings
Configure network settings that apply to all network adapters on the server.
Interfaces
Configure the properties of each network interface on the server.
Administrator
Change the password for your current administrator account.
Administration Web Site
Specify which IP address(es) and port are used to access the administration Web site.
Telnet
Configure the use of Telnet to administer the server.
SNMP Settings
Configure SNMP Settings
iLO Settings
Configure iLO Settings
Done
Local intranet

Figure 8: Network menu

Setup Completion

After the NAS device is physically set up and the basic configuration is established, additional setup steps must be completed. Depending on the deployment scenario of the NAS device, these steps may vary.

Additional setup steps may include:

- Activating the iLO port using the license key
- Setting up Ethernet NIC teams (optional)
- Managing system storage
- Creating and managing users and groups
- Creating and managing file shares

Each of these setup steps is discussed in the following sections.

Activating the iLO Port Using the License Key

The Remote Desktop feature of the iLO port requires a license key. The key is included with the product inside the Country Kit. Refer to the iLO Advanced License Pack for activation instructions.

To access the iLO port, click on **HP Utilities**, then click **Remote Management**.

Setting up Ethernet NIC Teams (Optional)

The NAS 2000s is equipped with the HP Network Teaming and Configuration utility. The utility allows administrators to configure and monitor Ethernet network interface controllers (NIC) teams in a Windows-based operating system. These teams provide options for increasing fault tolerance and throughput.

Fault tolerance provides automatic redundancy. If the primary NIC fails, the secondary NIC takes over. Load Balancing provides the ability to balance transmissions across NICs.

Note: The NAS server ships with the NIC teaming utility available, however it must be installed and configured.

Note: Installing NIC teaming requires a restart of the server.

Procedures include:

- Installing the HP Network Teaming utility
- Opening the HP Network Teaming utility
- Adding and configuring NICs in a team
- Configuring the NIC team properties
- Checking the status of the team
- NIC teaming troubleshooting

Installing the HP Network Teaming Utility

Before using the HP Network Teaming utility, it must be installed.

Note: Installing and configuring NIC teaming should always be performed via iLO port or the console using a direct attached keyboard, monitor, and mouse since IP connections could be reset during the configuration process. Do not use Remote Desktop.

To install the HP Network Teaming utility:

1. In the URL field of the Web browser, enter the IP address of the Integrated Lights-Out port.

Note: The iLO port requires a license key. The key is included with the product inside the Country Kit. Refer to the iLO Advanced License Pack for activation instructions.

Note: The iLO port can also be accessed from the HP Utilities tab of the WebUI by clicking the remote management link.

2. At the Integrated Lights-Out Account Login screen, supply the username and password for the iLO and click **Login**.
3. Click the Remote Console tab. The Remote Console Information screen is displayed.
4. Click on the Remote Console choice in the menu on the left side of the screen.
5. Press the **Ctrl-Alt-Del** button to login to the console.
6. Supply an administrator username and password. The NAS server desktop is displayed.
7. Double-click the **HP Network Teaming Setup** icon on the desktop.

   If the icon is not displayed, enter the following command after selecting Start/Run:

   `c:\winnt\bin\nicteam\EN\cpqsetup.exe (English)`

   `c:\winnt\bin\nicteam\JP\cpqsetup.exe (Japanese)`
8. When the following message box is displayed, click **Install**.

hp ProLiant Package Setup
HP ProLiant Setup is ready to install the contents of this package. Press 'Install' to run the installation program or press 'Close' to exit.
hp ProLiant Network Teaming and Configuration for Windows Server 2003
Version: 7.30.730.0
With the HP ProLiant Network Teaming and Configuration Utility, you can configure and monitor HP ProLiant Network Interface Controllers (NIC) running under Microsoft Windows Server 2003.
Install
Close

Figure 9: Installing Network Teaming

9. When the installation process is complete, the following screen is displayed. Click **Close**.

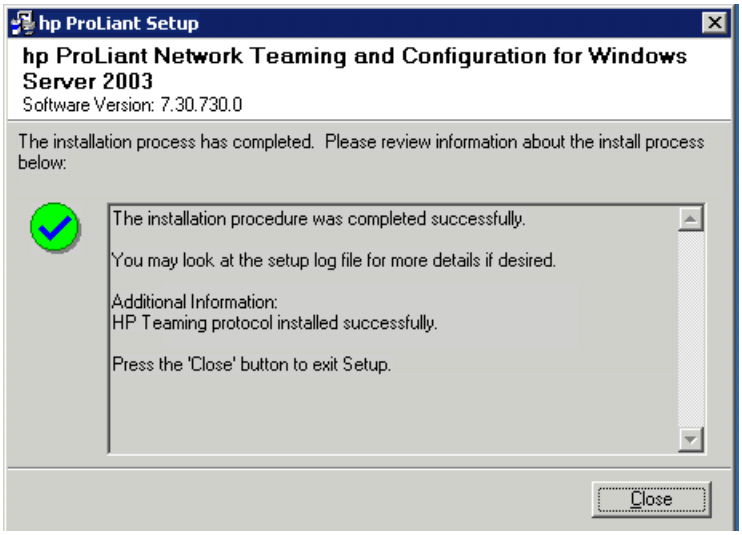

hp ProLiant Setup
hp ProLiant Network Teaming and Configuration for Windows Server 2003
Software Version: 7.30.730.0
The installation process has completed. Please review information about the install process below:
The installation procedure was completed successfully.
You may look at the setup log file for more details if desired.
Additional Information:
HP Teaming protocol installed successfully.
Press the 'Close' button to exit Setup.
Close

Figure 10: Network Teaming installation complete

10. Restart the system.

Caution: To ensure proper functioning of the software, the server must be restarted at this time.

Opening the HP Network Teaming Utility

The HP Network Teaming utility is now accessible from the Windows toolbar at the bottom of the NAS server desktop. To open the utility, click the **HP Network Teaming utility** icon.

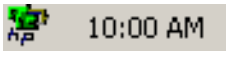


Figure 11: HP Network Teaming utility icon

Adding and Configuring NICs in a Team

Before a NIC is teamed, verify the following:

- The NICs must be on the same network.
- The NICs must be DHCP enabled and the DNS server address must be left blank.

Note: The teaming utility becomes unstable if static IP addresses, subnets, and DNS addresses are set before teaming.

- Duplex and speed settings must be set to use the default values.

To team the NICs:

1. Open the HP Network Teaming utility. The **Network Teaming and Configuration Properties** dialog box is displayed. The type of NIC and the slot and port used is shown.

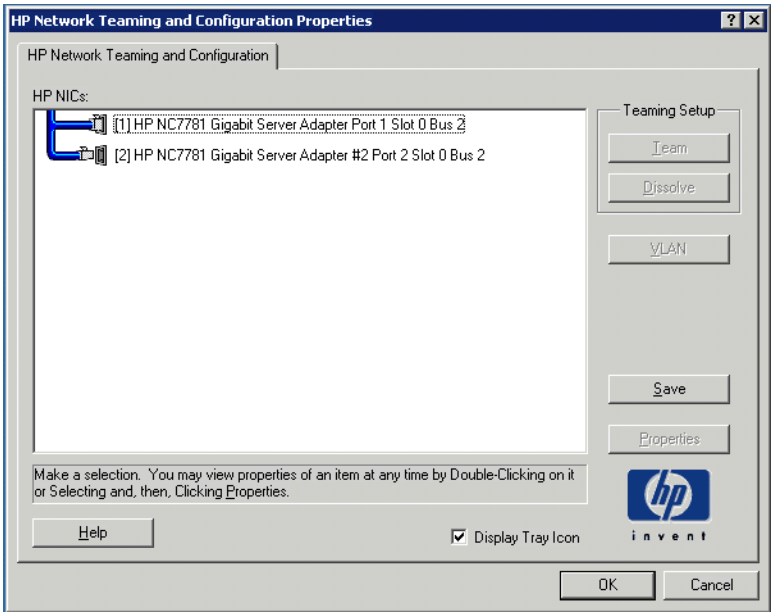

HP Network Teaming and Configuration Properties
HP Network Teaming and Configuration
HP NICs:
[1] HP NC7781 Gigabit Server Adapter Port 1 Slot 0 Bus 2
[2] HP NC7781 Gigabit Server Adapter #2 Port 2 Slot 0 Bus 2
Teaming Setup
Team
Dissolve
VLAN
Save
Properties
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.
Help
Display Tray Icon
invent
OK
Cancel

Figure 12: HP Network Teaming Properties dialog box

2. Highlight the NICs to team.
3. Click the **Team** button. The **Teaming Controls** tab of the Properties dialog box is displayed.

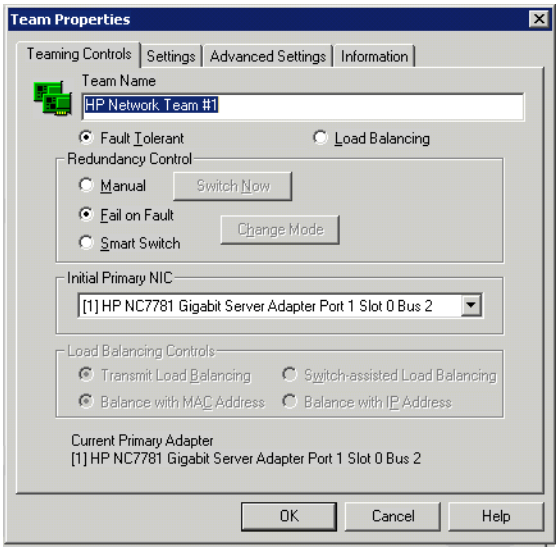


Figure 13: NIC Properties, Teaming Controls tab, Fault Tolerant option

4. Configure the team by choosing either **Fault Tolerant** or **Load Balancing**.

   The fault tolerance and load balancing options are discussed in the following sections.

Fault Tolerance

The Fault Tolerance teaming option provides three redundancy control options:

- **Manual**—This setting allows change from a Primary NIC to a Secondary NIC only when **Switch Now** is clicked.

Note: The **Switch Now** option is disabled until **Manual** is selected and then **OK** is clicked.

- **Fail on Fault**—This setting automatically switches from a primary NIC to a secondary NIC when the primary NIC fails.
- **Smart Switch**—This setting lets a member of a team be selected as the preferred Primary Smart Switch NIC. As long as this NIC is operational, it is always the active NIC. If the NIC fails and it is eventually restored or replaced, it automatically resumes its status as the active NIC.

Note: **Smart Switch** is the recommended choice for fault tolerance.

Detailed information about configuring teams for fault tolerance can be found in the HP Network Teaming utility help.

Load Balancing

The **Load Balancing** teaming option provides four load balancing control options:

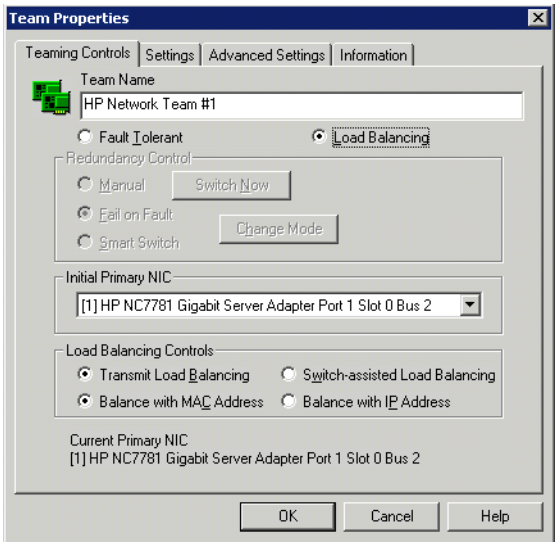


Figure 14: NIC Properties, Teaming Controls tab, Load Balancing option

Detailed information about these four load balancing teaming options can be found in the HP Network Teaming Help.

- **Transmit Load Balancing**—All transmit IP frames are load balanced among all team members based on a Load Balancing algorithm in the teaming device driver. The Current Primary adapter transmits all other frames, and receives all frames for the team. If a failover event occurs, one of the non-Primary adapters assumes the role of Current Primary adapter, and transmit IP packets are load balanced among all remaining team members. If a failure occurs in any of the non-Primary adapters, the packets are load balanced among all remaining team members.
- **Switch-assisted Load Balancing**—All transmit packets are load balanced among all team members based on a Load Balancing algorithm in the teaming device driver. The receive packets are load balanced among all team members by the switch. If a failure of any team member occurs, the packets are load balanced among the remaining adapters. There is no primary adapter in a Switch-assisted Load Balancing team.
- **Balance with MAC Address**—This feature allows load balancing of IP packets among the teamed NICs using the last four bits of the MAC Address. (See following Note.)
- **Balance with IP Address**—This feature allows load balancing of IP packets among the teamed NICs using the last four bits of the IP Address. (See following Note.)

Note: The teaming utility can load balance IP packets among the teamed NICs installed in a server. The primary NIC in the team receives all incoming packets. The choice is available to load balance with the source MAC address (the address transmitted from the workstation) or the source IP address.

Using the last four bits of either source address, the teaming driver algorithm assigns this source address to the port of one of the NICs in the team. This port is then used to transmit all packets destined for that source address. If there are four NICs in the team, the packets are received by the primary NIC on the team. The packets are retransmitted through one of the four ports.

---

5. Click **OK** to accept the team properties.
6. Click **OK** in the HP Network Teaming and Configuration Properties Screen to apply the changes.
7. Click **Yes** when prompted to apply all configuration changes. Wait while the adapters are configured. This process could take several seconds.
8. The following screen is displayed, indicating that there are additional procedures to perform in the NIC teaming process. Click **Yes** to reboot now.

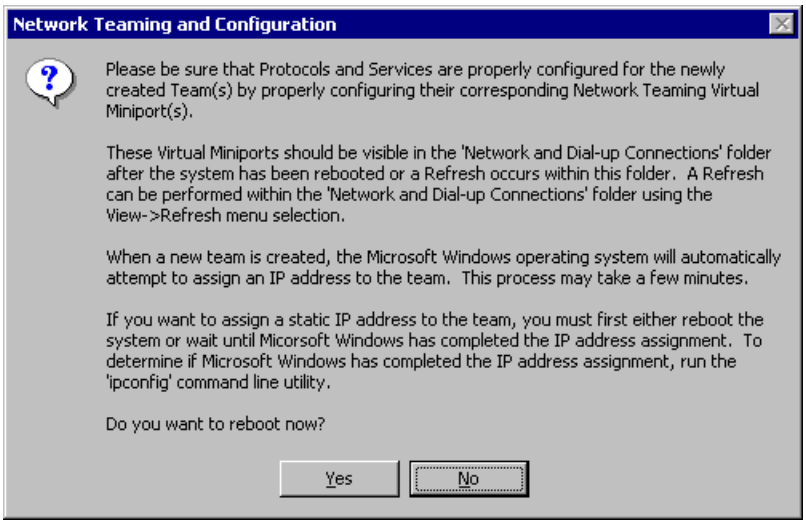

Network Teaming and Configuration
Please be sure that Protocols and Services are properly configured for the newly created Team(s) by properly configuring their corresponding Network Teaming Virtual Miniport(s).
These Virtual Miniports should be visible in the 'Network and Dial-up Connections' folder after the system has been rebooted or a Refresh occurs within this folder. A Refresh can be performed within the 'Network and Dial-up Connections' folder using the View->Refresh menu selection.
When a new team is created, the Microsoft Windows operating system will automatically attempt to assign an IP address to the team. This process may take a few minutes.
If you want to assign a static IP address to the team, you must first either reboot the system or wait until Micorsoft Windows has completed the IP address assignment. To determine if Microsoft Windows has completed the IP address assignment, run the 'ipconfig' command line utility.
Do you want to reboot now?
Yes
No

Figure 15: HP Network Teaming dialog box

Configuring the NIC Team Properties

At this point, the NICs are teamed but are not completely configured. Additional procedures include:

- Renaming the teamed connection
- Selecting the option to show an icon on the taskbar
- Configuring TCP/IP on the new team

Renaming the Teamed Connection

The assigned name for the new NIC team connection is “Local Area Connection X,” where X represents the next available connection number generated by the system. HP recommends changing this name to a more meaningful name, such as “NIC Team.”

To change the name of the connection:

1. From the desktop, right-click the **My Network Places** icon, then click **Properties**. The **Network and Dial up Connections** screen is displayed.
2. Move the cursor over each connection icon to view the pop up box of the icon's name. Locate **HP Network Teaming Virtual Miniport**.
3. Right-click the connection icon for **HP Network Teaming Virtual Miniport**, and select **Rename**. Enter a name that is more descriptive than “Local Area Connection X,” such as “NIC Team.”

Showing a Connection Icon on the Taskbar

To show a connection icon:

1. In the **Network and Dial up Connections** screen, double-click the **NIC Team** connection, and then click **Properties**.
2. At the bottom of the screen, select **Show icon in task bar when connected**, and then click **Close**.

Configuring the TCP/IP Protocol on the New Team

After teaming the NICs, a new virtual network adapter for the team is automatically created. However, by default the new adapter is set to DHCP. To manually configure the IP address, perform the following steps.

To enter the TCP/IP address information for the team:

1. From the desktop, go to the **Network and Dial up Connections** screen and click **Properties**. Right-click the **NIC Team** icon and then select **Properties**. A screen similar to the following is displayed.

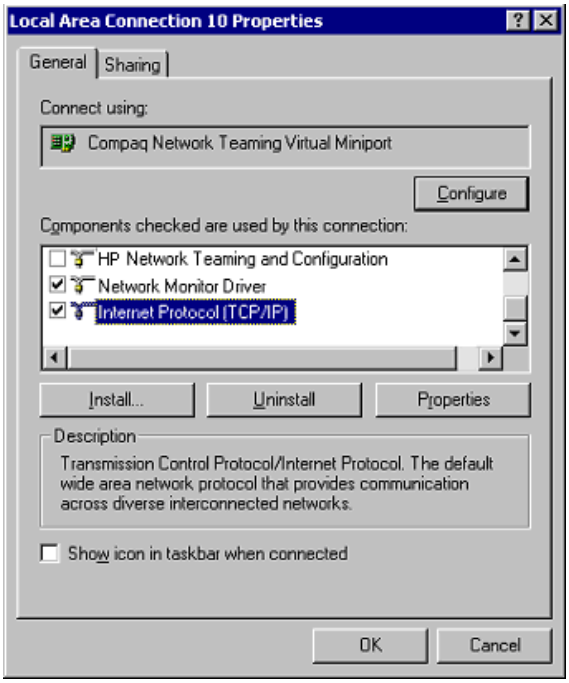


Figure 16: NIC Team Properties dialog box

2. Use the arrows and the scroll bar on the right of the screen to scroll through the **Components** list.

3. Click **Internet Protocol (TCP/IP)** and then click **Properties**. The following screen is displayed:

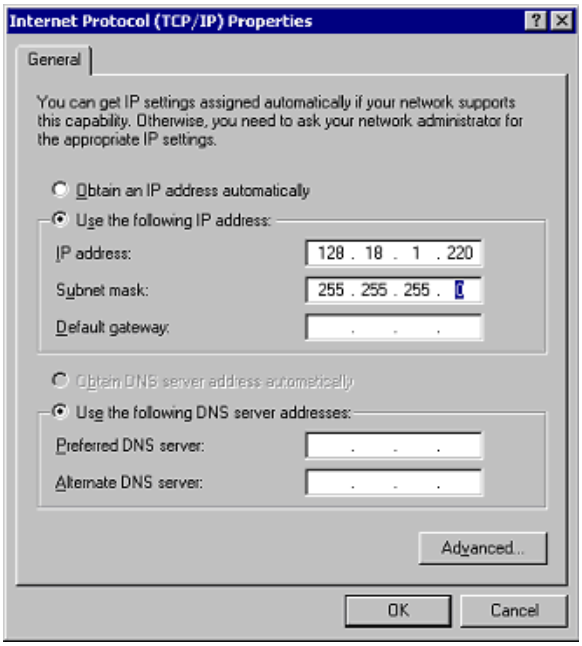

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
128 . 18 . 1 . 220
Subnet mask:
255 . 255 . 255 .
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 17: NIC Team TCP/IP Properties dialog box

Note: If a NIC is teamed, do not modify the TCP/IP settings for the individual NIC ports.

4. Select **Use the following IP address**, and enter the IP address and subnet mask. If desired, enter the default gateway.
5. Click **OK**. The Ethernet Team should be working.

Checking the Status of the Team

To check the status of the Ethernet Team, open the HP Network Teaming utility. The **Configuration Properties** screen is displayed, showing the teamed NICs.

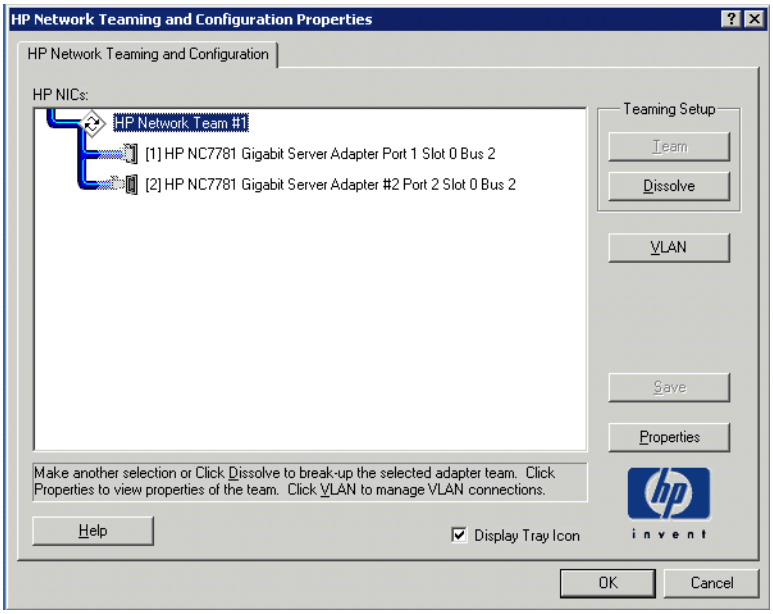

HP Network Teaming and Configuration Properties
HP Network Teaming and Configuration
HP NICs:
HP Network Team #1
[1] HP NC7781 Gigabit Server Adapter Port 1 Slot 0 Bus 2
[2] HP NC7781 Gigabit Server Adapter #2 Port 2 Slot 0 Bus 2
Teaming Setup
Team
Dissolve
VLAN
Save
Properties
Make another selection or Click Dissolve to break-up the selected adapter team. Click Properties to view properties of the team. Click VLAN to manage VLAN connections.
Help
Display Tray Icon
invent
OK
Cancel

Figure 18: NIC Teaming status

NIC Teaming Troubleshooting

Problems with the NIC teaming feature are diagnosed by the connection icons displayed in the **HP Network Teaming and Configuration** dialog box. The following table lists the error icons for RJ 45 NICs.

Table 2: NIC Teaming Troubleshooting

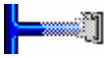
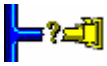
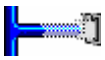
RJ-45	Description
	Active OK—The NIC is operating properly. The driver is installed in the registry and is loaded. If the NIC is a member of a team, the NIC is active.
	Installed inactive—The NIC is installed and is OK, but is not active.
	Cable fault—The driver is installed in the registry and is loaded. The broken cable indicator means that the cable is unplugged, loose, broken, or the switch or hub is not operating properly. If this icon is displayed, check all network connections and make sure the hub/switch is working properly. When the connection is restored, this icon will change.
	Inactive cable fault—A cable fault has occurred while the NIC was inactive.

Table 2: NIC Teaming Troubleshooting

RJ-45	Description
	Hardware failure—The driver is installed in the registry and is loaded. The driver is reporting a hardware problem with the NIC. This indicates a serious problem. Contact your HP authorized service provider.
	Unknown—The server is unable to communicate with the driver for the installed NIC. The NIC is installed in the registry, but the driver is not. This error occurs when the NIC has been installed but the server has not been restarted. If this problem persists after the server has been restarted, the driver has not been loaded or the Advanced Network Control utility is unable to communicate with the driver. **Note:** Only NICs assigned as members of a team are displayed as Unknown. If a teamed NIC is turned off, it displays as Unknown.
	Disabled—The NIC has been disabled through the Device Manager or NCPA.

For more advanced problems with NIC teaming, refer to the help section in the HP Teaming and Configuration utility.

Managing System Storage

The NAS administrator uses the Array Configuration Utility (ACU) to manage the storage hardware, Disk Manager to manage volumes, and Shadow Copies to manage snapshots. See the following chapters for more detailed information on managing system storage:

- Chapter 3 provides a storage management overview
- Chapter 4 discusses disk management procedures
- Chapter 5 discusses snapshot (shadow copy) management procedures.
- Chapter 7 discusses folder and share management procedures.

Creating and Managing Users and Groups

User and group information and permissions determine whether a user can access files. If the NAS device is deployed into a workgroup environment, this user and group information is stored locally on the device. By contrast, if the NAS device is deployed into a domain environment, user and group information is stored on the domain.

To enter local user and group information, see Chapter 6.

Creating and Managing File Shares

Files shares must be set up, granting and controlling file access to users and groups. See Chapter 7 for complete information on managing file shares.

UNIX specific information is discussed in the “Microsoft Services for NFS” chapter.

Storage Management Overview

3

With the HP StorageWorks NAS 2000s the administrator has complete control over all storage issues. The NAS administrator uses the Array Configuration Utility (ACU) to manage the hardware storage, Disk Manager to manage the volume level, and Shadow Copies to manage the shadow copies (snapshots).

The NAS 2000s is configured at the factory with default system settings and with the NAS operating system installed. Storage, however, is not pre-configured, allowing the NAS administrator to tailor the organization and configuration of the storage to specific environmental needs. Refer to the "Storage Management Process" section later in this chapter for more information.

This chapter defines and discusses physical, logical, and snapshot storage concepts on the HP StorageWorks NAS 2000s.

Additional storage management information is included in the following chapters:

- Chapter 4 discusses disk management procedures
- Chapter 5 discusses snapshot (shadow copy) management procedures.
- Chapter 7 discusses folder and share management procedures.

Storage Management Process

The lowest level of storage management occurs at the physical drive level. Physical drives are grouped into arrays for better performance and fault tolerance.

The arrays are then configured with RAID fault tolerance and presented to the operating system as logical drives or units, which are called LUNs.

At the virtual level of storage, Disk Manager is used to take the LUNs and create basic or dynamic disks, which can then be broken down into partitions or volumes. Folders, subfolders, and file shares are created on the resulting volumes or partitions to organize, store, and give access to the data. The Shadow Copies utility is used to create snapshots of the data at specific times.

For organizational and documentation purposes, this administration guide separates physical storage from logical storage.

See Figure 19 for an illustration of these storage management elements.

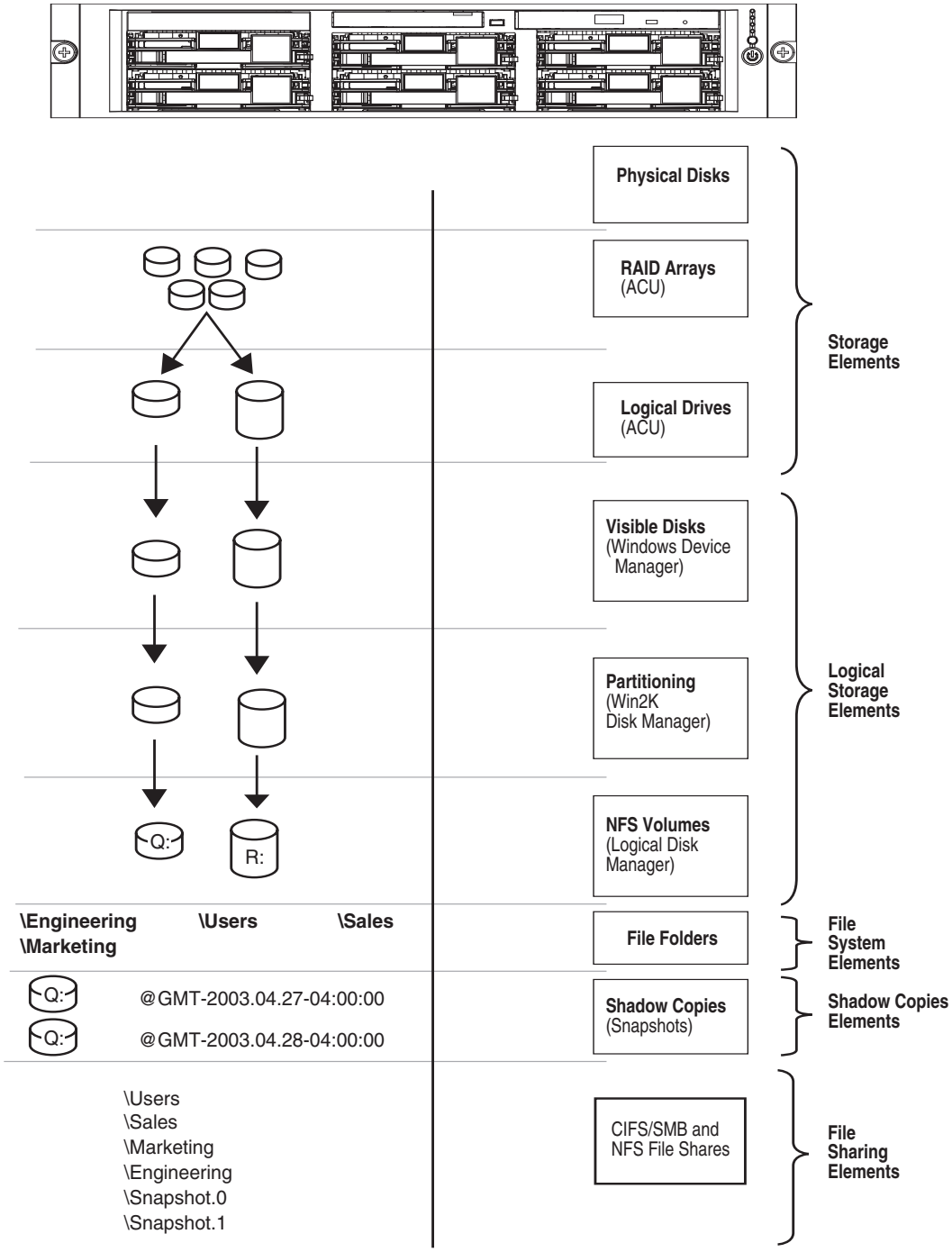


Figure 19: Storage Management process

Storage Elements Overview

Note: Each fully populated HP StorageWorks 4300/4400 Family storage enclosure supports up to 14 hard drives.

Preliminary physical storage management tasks involve managing:

- Physical Hard Drives
- Arrays
- Logical Drives (LUNs)

Drive array concepts and data protection methods, including fault tolerance options are discussed in this section. This information will help guide decisions on how to best configure the arrays.

Physical Hard Drives

For personal or small business use, the capacity and performance of a single hard drive is adequate. However, larger businesses demand higher storage capacities, higher data transfer rates, and greater security from data loss if drives fail.

Merely adding extra drives to the system increases the total storage capacity, but has little effect on the system efficiency, because data can only be transferred to one hard drive at a time.

Figure 20 illustrates the read/write process with separate physical hard drives.

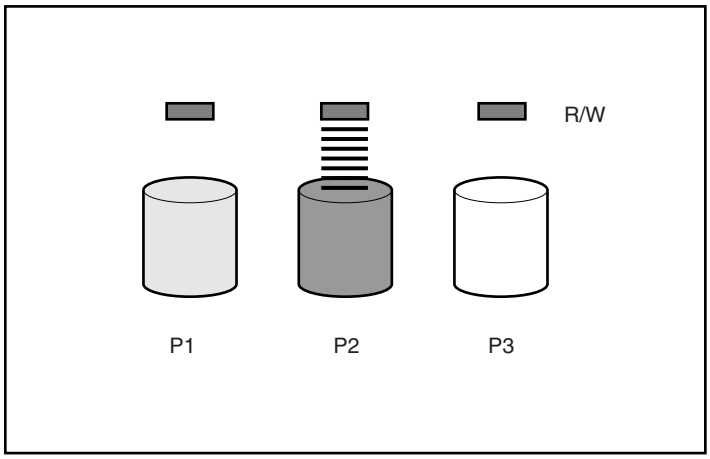


Figure 20: Separate physical drive (P1, P2, P3) read/write (R/W) operations

Arrays

With an array controller installed in the system, the capacity of several physical drives can be logically combined into one or more logical units called arrays. When this is done, the read/write heads of all the constituent physical drives are active simultaneously, dramatically reducing the overall time required for data transfer.

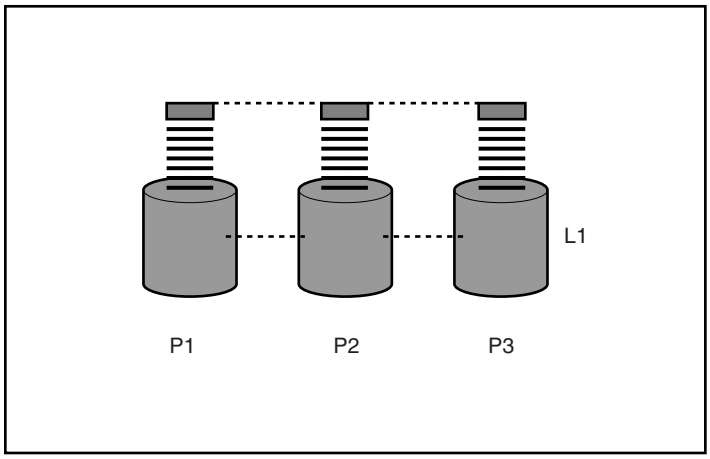


Figure 21: Configuring the physical drives into an array dramatically improves read/write efficiency

Because the read/write heads are active simultaneously, the same amount of data is written to each drive during any given time interval. Each unit of data is termed a block. The blocks form a set of data stripes over all the hard drives in an array, as shown in Figure 22.

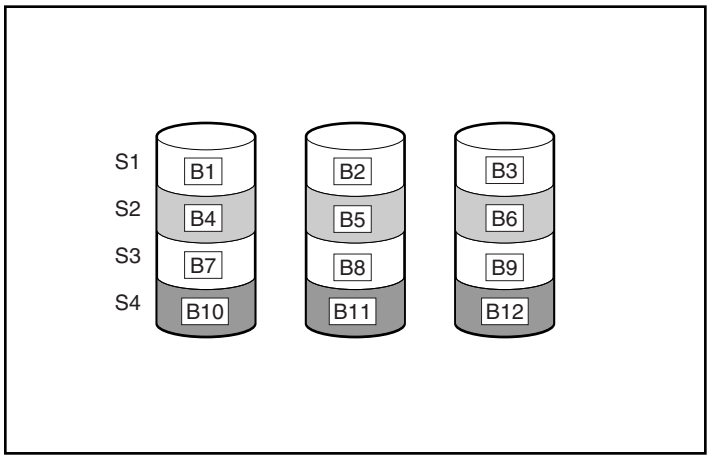


Figure 22: RAID 0 (data striping) (S1-S4) of data blocks (B1-B12)

For data in the array to be readable, the data block sequence within each stripe must be the same. This sequencing process is performed by the array controller, which sends the data blocks to the drive write heads in the correct order.

A natural consequence of the striping process is that each hard drive in a given array will contain the same number of data blocks.

Note: If one hard drive has a larger capacity than other hard drives in the same array, the extra capacity is wasted because it cannot be used by the array.

Logical Drives (LUNs)

As previously stated, drive array technology distributes data across a series of individual hard drives to unite these physical drives into one or more higher performance arrays. Distributing the data allows for concurrent access from multiple drives in the array, yielding faster I/O rates than non arrayed drives.

While an array is a physical grouping of hard drives, a logical drive is the configuration of the arrays that is presented to the operating system.

When planning to allocate space on the NAS device, consider that the maximum number of LUNs in a dynamic disk is 32 and the largest single LUN that can be utilized by the operating system is 2 TB. It should also be noted that the largest basic disk that can exist is 2 TB and the largest volume that can exist is 64 TB. Format of the partition or volume impacts the largest file system that can exist as well.

HP recommends creating one logical drive from the array. After the physical drives are grouped into arrays, they are ready to be converted into logical drives.

It is important to note that a LUN may extend over (span) all physical drives within a storage controller subsystem, but cannot span multiple storage controller subsystems.

After a LUN has been created, it is possible to extend the size, either through the HP Array Configuration Utility or via Disk Management. See chapter 4 for additional information.

Note: After a LUN has been extended, you must go into Disk Manager to allocate that space.

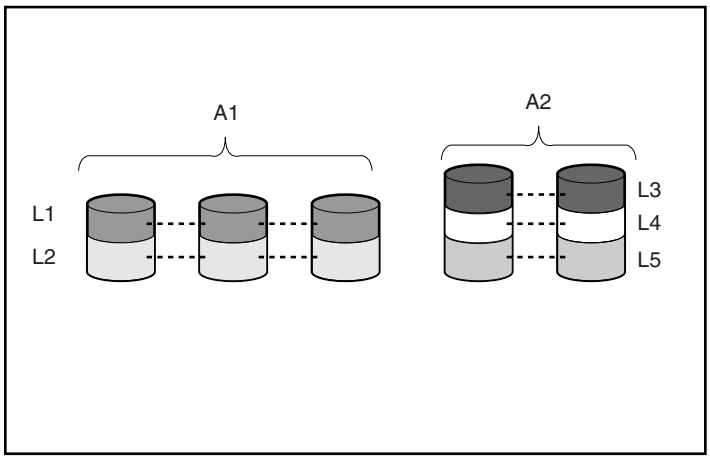


Figure 23: 2 arrays (A1, A2) and 5 logical drives (L1 through L5) spread over 5 physical drives

Drive failure, although rare, is potentially catastrophic. For example, in the previous figure using simple striping, failure of any hard drive will lead to failure of all logical drives in the same array, and hence to data loss.

To protect against data loss from hard drive failure, arrays should be configured with fault tolerance. Several fault tolerance methods have been devised and are described in the following sections.

Fault-Tolerance Methods

Different RAID (redundant array of independent disks) types use different methods of striping the arrays and different ways of writing data and parity to the drives to offer a variety of fault tolerance and capacity usage. The RAID methods supported by the NAS 2000s include:

- RAID 0—Data Striping only, no fault tolerance
- RAID 1+0—Drive Mirroring and striping
- RAID 5—Distributed Data Guarding
- RAID ADG—Advanced Data Guarding (ADG)

Further protection against data loss can be achieved by assigning an online spare to an array. This hard drive contains no data and is contained within the same storage subsystem as the other drives in the array. When a hard drive in the array fails, the controller can then automatically rebuild information that was originally on the failed drive onto the online spare. This quickly restores the system to full RAID level fault tolerance protection.

Note: The ADG feature is available only with the optional Smart Array 5304/6404 Controller installed. RAID 1+0 support requires an even number of drives. Refer to Table 3 for more information.

These fault tolerance methods are discussed in the following paragraphs.

RAID 0—Data Striping

This configuration provides striping of the array to improve read and write performance, but offers no redundancy of data and therefore no protection against data loss when a drive fails. However, RAID 0 is useful for rapid storage of large amounts of noncritical data (for printing or image editing, for example) or when cost is the most important consideration.

When creating RAID 0 arrays, carefully consider how many drives to include in the array. Statistically, the chance of a drive failure increases with each additional drive that is included in an array. Based upon laboratory testing, HP recommends including no more than 7 drives in a RAID 0 array.

See Figure 22 for an illustration of the data striping technique.

Advantages

- Highest performance method for reads and writes
- Lowest cost per unit of data stored
- All drive capacity is used to store data; none is used for fault tolerance

Disadvantages

- All data on logical drive is lost if a hard drive fails
- Cannot use an online spare
- Data can only be preserved by being backed up to external media

RAID 1+0—Drive Mirroring and Striping

In this configuration, information on one drive is duplicated onto a second drive, creating identical copies of the information as shown in Figure 24. Therefore, this method provides the best fault tolerance. RAID 1+0 requires an even number of drives and is the only method for fault tolerance protection if only two drives are installed or selected for an array. If more than two drives are in an array, the data is striped across all of the drives in the array.

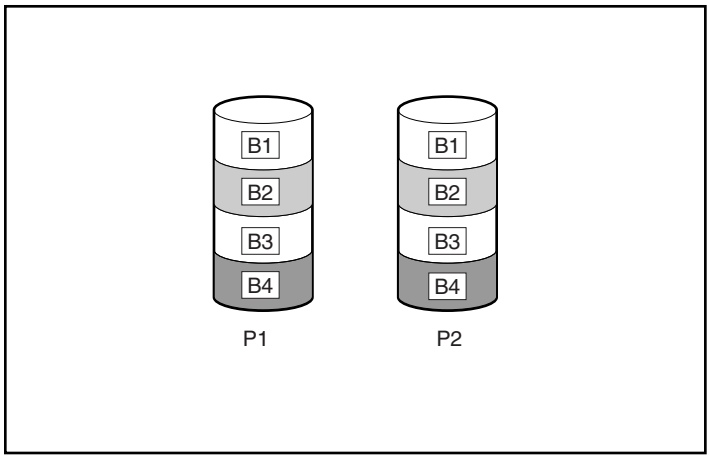


Figure 24: RAID 1+0 (drive mirroring) of P1 onto P2

This method is useful when high performance and data protection are more important than the cost of hard drives. The operating system drives are mirrored. If one drive fails, the mirror drive immediately takes over and normal system operations are not interrupted.

Note: HP supports a configuration that uses RAID 1+0 on the system drives in a two drive RAID array.

Caution: If two drives being mirrored to each other both fail, data loss occurs.

Advantages

Drive mirroring offers:

- The highest read and write performance of any fault-tolerant configuration.
- Protection against data loss if one drive fails.
- Data preservation in a RAID 1+0 system, when more than one drive fails, as long as none of the failed drives are mirrored to another failed drive.

Disadvantages

Some disadvantages of drive mirroring are:

- Increased expense—Since many drives must be used for fault tolerance and hard drives must be added in pairs.
- Decreased storage capacity—Only 50% of the total drive capacity is usable.

RAID 5—Distributed Data Guarding

Using this method, a block of parity data (rather than redundant data) is calculated for each stripe from the data that is in all other blocks within that stripe. The blocks of parity data are distributed over every hard drive within the array, as shown in the figure below. When a hard drive fails, data on the failed drive can be rebuilt from the parity data and the user data on the remaining drives. This rebuilt data can be written to an online spare.

This configuration is useful when cost, performance, and data availability are equally important.

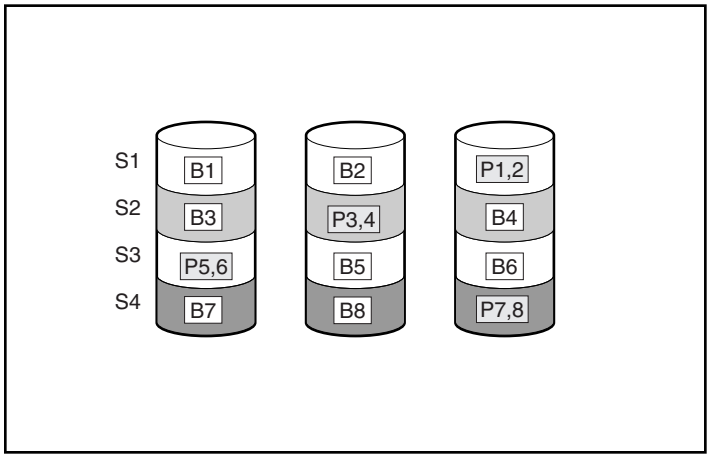


Figure 25: RAID 5 (distributed data guarding) showing parity information (P)

Spreading the parity across all the drives allows more simultaneous read operations and higher performance than data guarding (RAID 4). If one drive fails, the controller uses the parity data and the data on the remaining drives to reconstruct data from the failed drive. RAID 5 allows the system to continue operating with reduced performance until the failed drive is replaced. However, if more than one drive fails, RAID 5 also fails and all data in the array is lost.

Distributed data guarding uses the equivalent of one drive to store parity information and requires an array with a minimum of three physical drives. In an array containing three physical drives, distributed data guarding uses 33 percent of the total logical drive storage capacity for fault tolerance; a 14 drive configuration uses seven percent.

Note: Given the reliability of a particular generation of hard drive technology, the probability of an array experiencing a drive failure increases with the number of drives in an array. HP recommends the number of drives in a RAID 5 array not exceed 14.

Advantages

Distributed data guarding offers:

- High read and write performance
- Protection against data loss if one drive fails
- Increased usable storage capacity, since capacity equal to only one physical drive is used to store parity information

Disadvantages

Some disadvantages of distributed data guarding are:

- Lower write performance than RAID 0 or RAID 1+0
- Possibility of data loss if a second drive fails before data from the first failed drive has been rebuilt

RAID ADG—Advanced Data Guarding

RAID ADG is similar to RAID 5 in that parity information is generated (and stored) to protect against data loss caused by drive failure. With RAID ADG, however, two different sets of parity data are used. This allows data to still be preserved if two drives fail. As can be seen from Figure 26, each set of parity data uses up a capacity equivalent to that of one of the constituent drives, for a total parity usage of two drives of space.

This method is most useful when data loss is unacceptable, but cost must also be minimized. The probability that data loss will occur when configured with RAID ADG is less than when configured with RAID 5.

Note: The ADG feature is available only with the optional Smart Array 5304/6404 Controller installed.

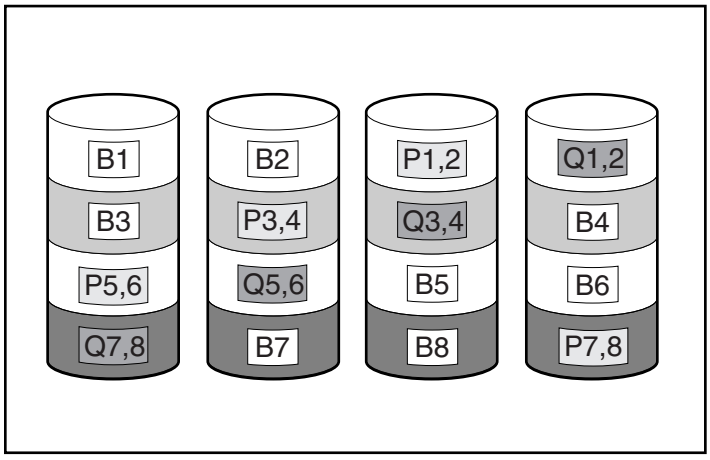


Figure 26: RAID ADG (advanced data guarding) with two sets of parity data

Advanced Data Guarding technology offers the best combination of fault tolerance and usable disk space among RAID levels.

This technology allows the safe deployment of large capacity disk drives and the creation of very large storage volumes without expensive overhead to protect business critical data. This technology provides more flexibility in responding to drive failures without the fear of costly server downtime.

Advance Data Guarding protects against multiple disk failures, while requiring the capacity of two drives in an array of up to 56 disk drives to be set aside for dual sets of distributed parity data. It provides data protection greater than RAID 5, and also has the capacity utilization efficiency similar to RAID 5.

Advantages

- High read performance
- High data availability-any two drives can fail without loss of critical data

Disadvantage

- Relatively low write performance (lower than RAID 5), due to the need for two sets of parity data

The table below summarizes the important features of the different kinds of RAID supported by the Smart Array controllers. The decision chart in the following table may help determine which option is best for different situations.

Table 3: Summary of RAID Methods

	RAID 0 Striping (no fault tolerance)	RAID 1+0 Mirroring	RAID 5 Distributed Data Guarding	RAID ADG Advanced Data Guarding
Usable drive space formula	n	n/2	(n-1)/n	(n-2)/n
Minimum number of hard drives	1	2	3	4
Maximum number of hard drives	N/A	N/A	14	56
Tolerant of single hard drive failure?	No	Yes	Yes	Yes
Tolerant of multiple simultaneous hard drive failure?	No	For RAID 1+0, if the failed drives are not mirrored to each other	No	Yes (two drives can fail)

Online Spares

Further protection against data loss can be achieved by assigning an online spare (or hot spare) to any configuration except RAID 0. This hard drive contains no data and is contained within the same storage sub system as the other drives in the array. When a hard drive in the array fails, the controller can then automatically rebuild information that was originally on the failed drive onto the online spare. This quickly restores the system to full RAID level fault tolerance protection. However, unless RAID ADG is being used, which can support two drive failures in an array, in the unlikely event that a third drive in the array should fail while data is being rewritten to the spare, the logical drive will still fail.

Physical Storage Best Practices

Minimally, choosing the best disk carving strategy includes the following policies:

- Analyze current corporate and departmental structure.
- Analyze the current file server structure and environment.
- Plan properly to ensure the best configuration and use of storage.
  - Determine the desired priority of fault tolerance, performance, and storage capacity.
  - Use the determined priority of system characteristics to determine the optimal striping policy and RAID level.

Logical Storage Elements Overview

Logical Storage elements consist of those components that translate the physical storage elements to the file system elements as presented in Figure 19. The NAS 2000s utilizes the Disk Manager (DM) to manage the various types of disk presented to the file system. DM has two types of LUN presentation, basic disk and dynamic disk. Each of these types of disk has special features that enable different types of management. Through the use of basic disks, primary partitions or extended partitions may be created. Partitions can only encompass one LUN. Through the use of dynamic disks, volumes can be created that span multiple LUNS.

DM can be used to convert disks to dynamic and back to basic, and manage the volumes residing on dynamic disks. Other options include the ability to delete, extend, mirror, and repair these elements.

The sections below briefly discuss each of these types of representations and the considerations that need to be observed.

More detailed information regarding DM use can be obtained through the online help of the tool.

Partitions

Partitions exist as either Primary Partitions or Extended Partitions and can be composed of only one Basic disk no larger than 2 TB. Basic disks can also only contain up to four primary partitions, or three primary partitions and one extended partition. In addition, the partitions on them cannot be extended beyond the limits of a single LUN. Extended partitions allow the user to create multiple logical drives. These partitions or logical disks can be assigned drive letters or be mounted as mount points on existing disks. The use of mount points in conjunction with NFS shares is not supported.

Volumes

When planning dynamic disks and volumes there is a limit to the amount of growth a single volume can undergo. Volumes are limited in size and are limited to no more than 32 separate LUNs with each LUN not exceeding 2 terabytes (TB). Volumes also cannot exceed 64 TB of disk space.

The RAID level of the LUNs included in a volume must be considered. All of the units that make up a volume should have the same high-availability characteristics. In other words, the units should all be of the same RAID level. For example, it would be a bad practice to include both a RAID 1+0 and a RAID 5 array in the same volume set. By keeping all the units the same, the entire volume retains the same performance and high-availability characteristics, making managing and maintaining the volume much easier. It should be noted that if a dynamic disk goes offline, then the entire volume dependent on the one or more dynamic disks is unavailable. There could be a potential for data loss depending on the nature of the failed LUN.

Volumes are created out of the dynamic disks and can be expanded on the fly to extend over multiple dynamic disks if they are spanned volumes. However, once a type of volume is selected it cannot be altered. For example, a spanning volume cannot be altered to a mirrored volume without deleting and recreating the volume, unless it is a simple volume. Simple volumes can be mirrored or converted to spanned volumes. Fault tolerant disks cannot be extended either. Therefore, selection of the volume type is important. Please note that the same performance characteristics on numbers of reads and writes apply when using fault tolerant configurations as is the case with controller based RAID. These volumes can also be assigned drive letters or be mounted as mount points off existing drive letters. In general, HP recommends utilizing the Array controller for the management of fault tolerance over the use of DM since DM places an additional level of operating system overhead on volumes. If mount points are utilized, it should be noted that Services for Unix does not support mount points at this time.

The administrator should carefully consider how the volumes will be carved up and what groups or applications will be using them. For example, putting several storage-intensive applications or groups into the same dynamic disk set would not be efficient. These applications or groups would be better served by being divided up into separate dynamic disks, which could then grow as their space requirements increased, within the allowable growth limits.

Utilizing DM Storage Elements

No matter which type of storage element is created in DM the last step in creating the element is determining its drive letter or mount point and formatting the element. Each element created can exists as a drive letter(s), assuming one is available and/or as mount points off of an existing folder of a drive letter. Either method is supported. However, mount points can not be utilized for shares that will be shared using Microsoft Services for Unix (NFS). They can be setup with both but the use of the mount point in conjunction with NFS shares causes instability with the NFS shares.

Formats consist of NTFS, FAT32, and FAT and all three types can be used on the NAS device. However, the Volume Shadow Copy Service can only utilize volumes that are NTFS formatted. Also, quota management is possible only on NTFS.

Volume Shadow Copy Service Overview

The Volume Shadow Copy Service (VSS) provides an infrastructure for creating point-in-time snapshots (shadow copies) of volumes. VSS supports 64 shadow copies per volume.

Shadow Copies of Shared Folders resides within this infrastructure and helps alleviate data loss by creating shadow copies of files or folders that are stored on network file shares at pre-determined time intervals. In essence, a shadow copy is a previous version of the file or folder at a specific point in time.

By using shadow copies, a NAS 2000s server can maintain a set of previous versions of all files on the selected volumes. End users access the file or folder by using a separate client add-on program, which enables them to view the file in Windows Explorer.

Shadow copies should not replace the current backup, archive, or business recovery system, but they can help to simplify restore procedures. For example, shadow copies cannot protect against data loss due to media failures, however, recovering data from shadow copies can reduce the number of times needed to restore data from tape.

Detailed information on Shadow Copies can be found in Chapter 5 of this guide.

File System Elements

File system elements are composed of the folders and subfolders that are created under each Logical Storage element (partitions, logical disks, and volumes). Folders are used to further subdivide the available file system providing another level of granularity for management of the information space. Each of these folders can contain separate permissions and share names that can be used for network access. Folders can be created for individual users, groups, projects, and so on.

Detailed information on file system elements can be found in Chapter 7 of this guide.

File-Sharing Elements

The NAS 2000s supports several file sharing protocols, including DFS, NFS, FTP, HTTP, and Microsoft SMB. On each folder or Logical Storage element, different file sharing protocols can be enabled using specific network names for access across a network to a variety of clients. Permissions can then be granted to those shares based on users or groups of users in each of the file sharing protocols.

Detailed information on file-sharing elements can be found in Chapter 7 of this guide.

Disk Management

4

Disk Management is core to the Windows NAS product. The process of creating storage elements and presenting them to the NAS OS is facilitated by the use of the WebUI. This chapter documents the contents of the WebUI for disks and volume management.

WebUI Disks Tab

The online Storage Guide provides an overview of the storage management process as a supplement to this administration guide.

The primary web page for facilitating disks and volume creation is illustrated in Figure 27. The figure in the diagram illustrates the process of creating arrays, volumes, and shadow copies. The diagram on the left illustrates the logical steps used to manage disks, beginning with the ACU at the top. The process follows the diagram from top to bottom and the selectable menu items from left to right on the page:

1. Create arrays and logical drives via ACU.
2. Create Windows 2003 disks via Disk Manager.
3. Create volumes via the WebUI.

To manage disks and volumes via the WebUI, click on **Disks**.

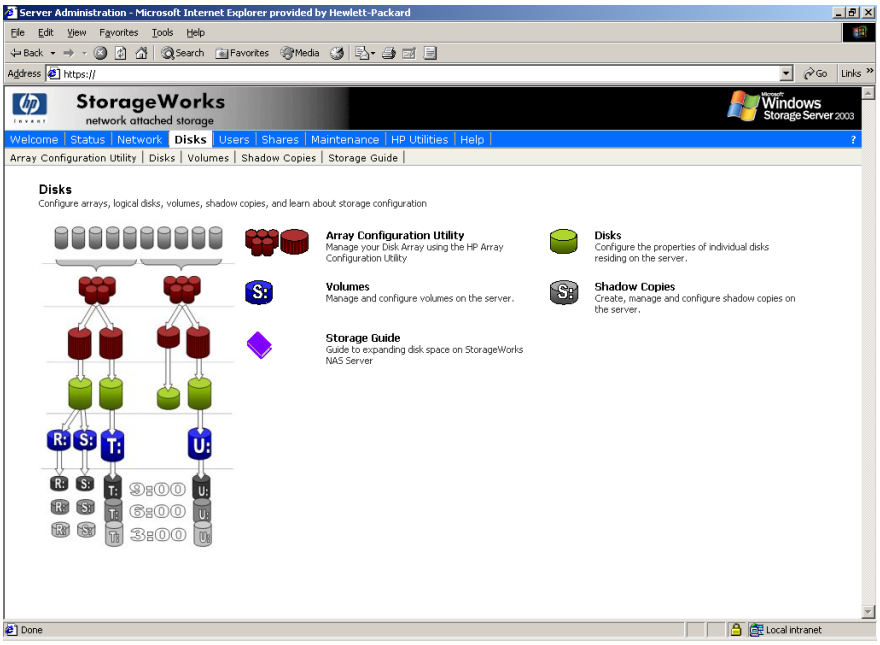

Server Administration - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Array Configuration Utility Disks Volumes Shadow Copies Storage Guide
Disks
Configure arrays, logical disks, volumes, shadow copies, and learn about storage configuration
Array Configuration Utility
Manage your Disk Array using the HP Array Configuration Utility
Disks
Configure the properties of individual disks residing on the server.
Volumes
Manage and configure volumes on the server.
Shadow Copies
Create, manage and configure shadow copies on the server.
Storage Guide
Guide to expanding disk space on StorageWorks NAS Server
Done
Local intranet

Figure 27: Disks menu

The Disks tab contains the following task items for configuring the NAS device:

Table 4: Disks Tab Options

Option	Task
Array Configuration Utility (ACU)	Configure SCSI array controllers installed inside or connected to the NAS system. Arrange individual physical disks as RAID arrays, and create logical disks from those arrays.
Disks	Manage logical disks. Observe disk capacity and status, scan for new disks, view detailed disk properties, create new volumes by launching the advanced Disks Management interface.
Volumes	Manage disk space usage by enabling quotas, scheduling disk defragmentation, and performing detailed volume management using the Manage item.
Shadow Copies	Manage shadow copies of shared folders on the volume. Shadow copies are read-only copies of shared data that provide users with a way to view, and, if necessary, restore to previous versions of files.
Storage Guide	Provides a detailed list of the procedures required to configure and create disks and volumes on NAS devices.

Storage Configuration Overview

Physical disks can be arranged as RAID arrays for fault tolerance and enhanced performance, then segmented into logical disks of appropriate sizes for particular storage needs. These logical disks then become the volumes that appear as drives on the NAS server.

Step 1: Create Disk Arrays

1. Click **Array Configuration Utility** on the **Disks** tab, and log in as an administrator to the Remote Desktop session.

   The Remote Desktop session automatically runs the Array Configuration Utility.

2. Select the proper array controller in the left pane of the interface before beginning array configuration. Some NAS systems are equipped with array controllers for both internal and external storage.

Consult the Help available in ACU for details on creating arrays, if necessary.

Step 2: Create Logical Disks from the Array Space

Continue using the ACU from the **Disks** tab.

1. Select a previously created array.
2. Click **Create Logical Drive** from the right pane of the ACU.
3. Complete the logical drive creation wizard to designate some or all of the array space as a logical disk.

Depending on how many physical disks are included in the array, several different types of logical disks are possible. Consult the ACU Help for details on creating logical disk drives.

Step 3: Verify newly created logical disks

1. Click **Disks** on the **Disk** tab.
2. Click **Rescan** to scan for newly created logical disks.
3. Verify that disks matching the newly created sizes are displayed.

Step 4: Create a Volume on the new logical disk

1. Click **Volumes** on the **Disks** tab.
2. Click **Manage**.
3. Click **Create New**.
4. Log into the Remote Desktop session as an administrator.

   The Remote Desktop session automatically runs the Disk Management interface.

5. In Disk Management, select one of the disk items representing the logical disk created previously with the ACU.
6. Initialize the disk as a basic or dynamic disk by right-clicking the disk item in the lower left pane of the Disk Management interface.
7. Select the initialized disk, and right-click the unallocated space representation.
8. Click **New Partition**.
9. Use the New Partition Wizard to create a new volume, format a filesystem, and mount the volume on a drive letter or subdirectory of another mounted volume.

Array Configuration Utility

RAID arrays and LUNs are created and can be managed using the HP Array Configuration Utility.

Features of ACU:

- Graphical representation of drive array configurations with wizards that help optimize array configuration
- Online spare (hot spare) configuration
- Separate fault tolerance configurations on a logical drive (LUN) basis
- Easy capacity expansion of arrays
- Online RAID level and stripe size migration
- Manages OS and data drives

Each time the Array Configuration Utility is run, it analyzes the configuration of the Array Controllers installed in the system. From the Main page various options are available to change or reconfigure the controller(s). This document only covers a subset of the functions available in the ACU. For complete documentation on ACU, refer to the comprehensive online help found within the ACU tool.

Using the ACU to Configure Storage

To configure storage:

1. Open the WebUI and navigate to the **Disks** tab.
2. Click on **Array Configuration Utility**. A new browser window opens, displaying the Systems Management Homepage.

Note: ACU is used to manage and configure array-based storage.

---

3. Log into the ACU utility. The default user name is `administrator` and the default password is `administrator`.

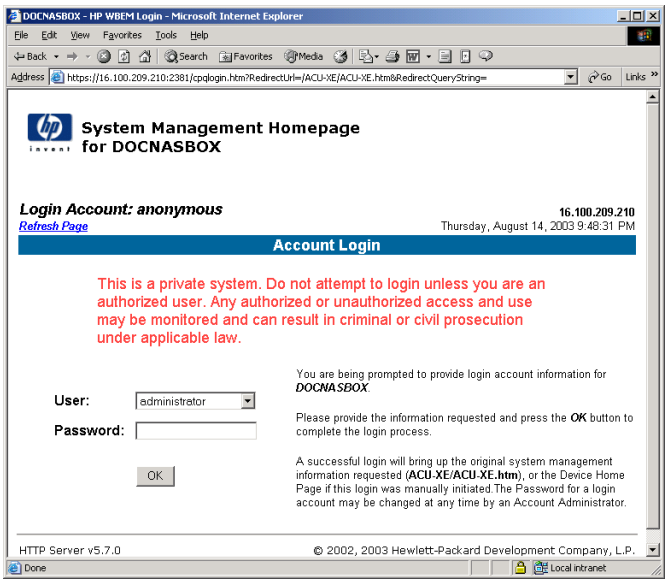

DOCNASBOX - HP WBEM Login - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address https://16.100.209.210:2381/cpqlogin.htm?RedirectUrl=/ACU-XE/ACU-XE.htm&RedirectQueryString=
System Management Homepage
for DOCNASBOX
Login Account: anonymous
Refresh Page
16.100.209.210
Thursday, August 14, 2003 9:48:31 PM
Account Login
This is a private system. Do not attempt to login unless you are an authorized user. Any authorized or unauthorized access and use may be monitored and can result in criminal or civil prosecution under applicable law.
User:
administrator
Password:
OK
You are being prompted to provide login account information for DOCNASBOX
Please provide the information requested and press the OK button to complete the login process.
A successful login will bring up the original system management information requested (ACU-XE/ACU-XE.htm), or the Device Home Page if this login was manually initiated.The Password for a login account may be changed at any time by an Account Administrator.
HTTP Server v5.7.0
© 2002, 2003 Hewlett-Packard Development Company, L.P.
Done
Local intranet

Figure 28: Systems Management Homepage

The Array Configuration Utility is displayed.

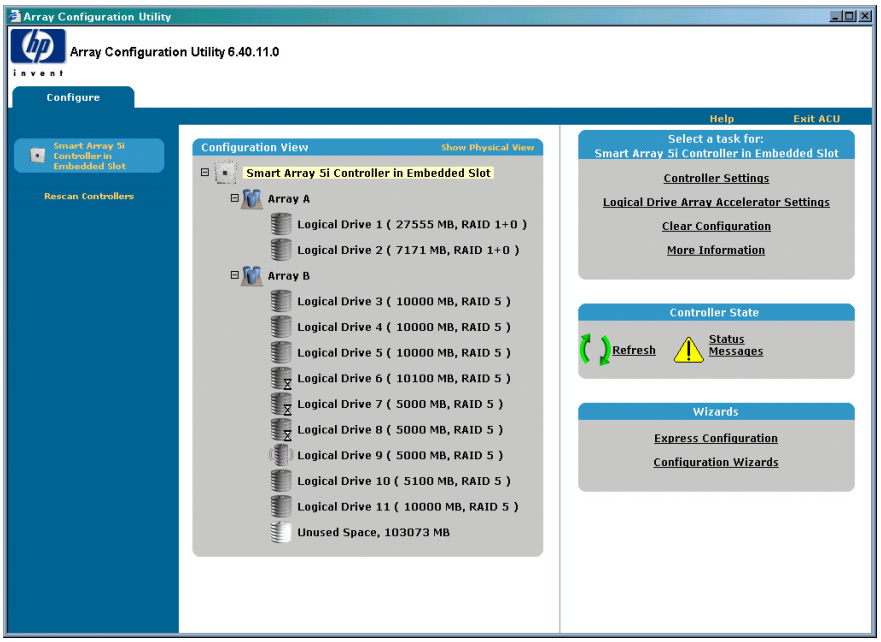

Array Configuration Utility
Array Configuration Utility 6.40.11.0
Configure
Help
Exit ACU
Smart Array 5i Controller in Embedded Slot
Rescan Controllers
Configuration View
Show Physical View
Smart Array 5i Controller in Embedded Slot
Array A
Logical Drive 1 (27555 MB, RAID 1+0)
Logical Drive 2 (7171 MB, RAID 1+0)
Array B
Logical Drive 3 (10000 MB, RAID 5)
Logical Drive 4 (10000 MB, RAID 5)
Logical Drive 5 (10000 MB, RAID 5)
Logical Drive 6 (10100 MB, RAID 5)
Logical Drive 7 (5000 MB, RAID 5)
Logical Drive 8 (5000 MB, RAID 5)
Logical Drive 9 (5000 MB, RAID 5)
Logical Drive 10 (5100 MB, RAID 5)
Logical Drive 11 (10000 MB, RAID 5)
Unused Space, 103073 MB
Select a task for:
Smart Array 5i Controller in Embedded Slot
Controller Settings
Logical Drive Array Accelerator Settings
Clear Configuration
More Information
Controller State
Refresh
Status Messages
Wizards
Express Configuration
Configuration Wizards

Figure 29: Array Configuration Utility

4. Select a controller from the list on the left side to begin configuration.
   - The controller named Smart Array 5i Controller in the embedded slot is for all drives in the server chassis, and drives contained in an external storage enclosure attached to the Smart Array 5i on the server head if present.

- The controller named Smart Array 6400 Controller (if present) is used for all externally SCSI attached storage.

Caution: On the Smart Array 5i controller there are two logical drives pre-configured under Array A. These two logical drives are configured for the NAS operating system and should not be altered.

5. After the controller is selected there are three ways to configure the storage:
   - **Express Configuration**

     Select **Express Configuration** to be asked a few simple questions and allow the controller to be configured automatically. The **Express Configuration** is the easiest and fastest way to configure a controller and will provide the most reasonable configuration possible.
   - **Configuration Wizards**

     Select **Configuration Wizards** to configure a controller through a series of wizards, which provides a guide through the configuration process. Choosing **Configuration Wizards** is not the fastest or easiest way to configure a controller, but it does offer more control over the configuration and provides for a more individualistic setup.
   - **Standard Configuration (default)**

     Select **Standard Configuration** to quickly configure a controller. Choosing **Standard Configuration** is the fastest way to configure a controller but requires an intermediate to advanced level of knowledge concerning storage. The Standard Configuration path offers the least amount of help or step-by-step guides and does not provide a FAQ panel, assuming the user knows exactly what they would like to accomplish and are very familiar with the concepts required to complete the task.

     The default method is the standard configuration method. The steps that follow are for creating an array using the standard configuration mode.
6. Click **Create Array**.
7. Select all of the drives to be included in the array and click **OK**.
8. Select the array that was just created and click on **Create logical Drive** at the right.
9. Select the desired Fault Tolerance, Stripe Size, and Size of the logical disk, and click **OK**.

   The Fault tolerance level depends on the amount of disks selected when the array was created. A minimum of two disks is required for a RAID 0+1 configuration, three disks for a RAID 5 configuration, and four disks for a RAID 5 ADG configuration.
10. After all logical disks have been created, click **Save**.
11. Click **Exit ACU** to exit the ACU session.

ACU Guidelines

- Do not modify Array A off of the Smart Array 5i controller as it contains the NAS OS
- Spanning more than 14 disks with a RAID 5 volume is not recommended
- Designate spares for RAID sets to provide greater protection against failures
- RAID sets cannot span controllers
- A single array can contain multiple logical drives of varying RAID settings.
- Extending and Expanding Arrays and Logical Drives is supported
- RAID migration is supported

Managing Disks

From the **Disks** tab of the WebUI, select **Disks**. The page displays the physical disks that are associated with the NAS device and the volumes that are created on them. Multiple volumes may appear on multiple disks depending on whether the volumes are simple, spanned, or multi-volumes/partitions exist. The page does not display what type of disk (basic or dynamic). To display this type of information click **Advanced Disk Management**.

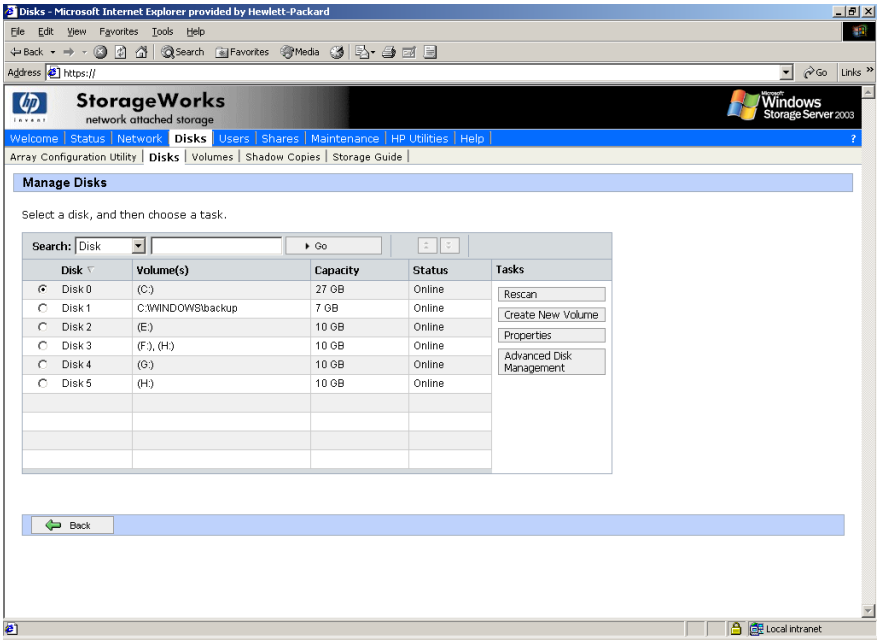

Disks - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help
Array Configuration Utility | Disks | Volumes | Shadow Copies | Storage Guide
Manage Disks
Select a disk, and then choose a task.
Search: Disk
Go
Disk | Volume(s) | Capacity | Status
Disk 0 | (C:) | 27 GB | Online
Disk 1 | C:\WINDOWS\backup | 7 GB | Online
Disk 2 | (E:) | 10 GB | Online
Disk 3 | (F:), (H:) | 10 GB | Online
Disk 4 | (G:) | 10 GB | Online
Disk 5 | (H:) | 10 GB | Online
Tasks
Rescan
Create New Volume
Properties
Advanced Disk Management
Back
Local intranet

Figure 30: Manage Disks screen

Table 5: Manage Disks Options

Option	Task
Rescan	Select to detect a new disk added to the system. By default, drives are dynamically recognized by the system. Occasionally a rescan of the hardware is required. The rescan is not synchronous and may require a browser refresh after the scan is initiated to display the new content.
Create New Volume	Select to open the Windows GUI Disk Management and create a new volume on a disk that was added to the system. This is accomplished via Remote Desktop and the Windows GUI Disk Management
Properties	Select to display the properties of the selected disk.
Advanced Disk Management	Select to open the Disk Management utility and perform disk management tasks, such as creating partitions, and changing basic disks to dynamic disks. Please see the online Disk Management help pages for complete documentation.

Disk Management Utility

When the **Create New Volume** or **Advanced Disk Management** button on the Manage Disks screen is selected, the Disk Management Utility is opened.

The Disk Management tool is a system utility for managing hard disks and the volumes, or partitions, that they contain. Disk Management is used to initialize disks, create volumes, format volumes with the FAT, FAT32, or NTFS file systems, and create fault-tolerant disk systems. Most disk-related tasks can be preformed in Disk Management without restarting the system or interrupting users; most configuration changes take effect immediately. A complete online help facility is provided with the Disk Management Utility for assistance in using the product.

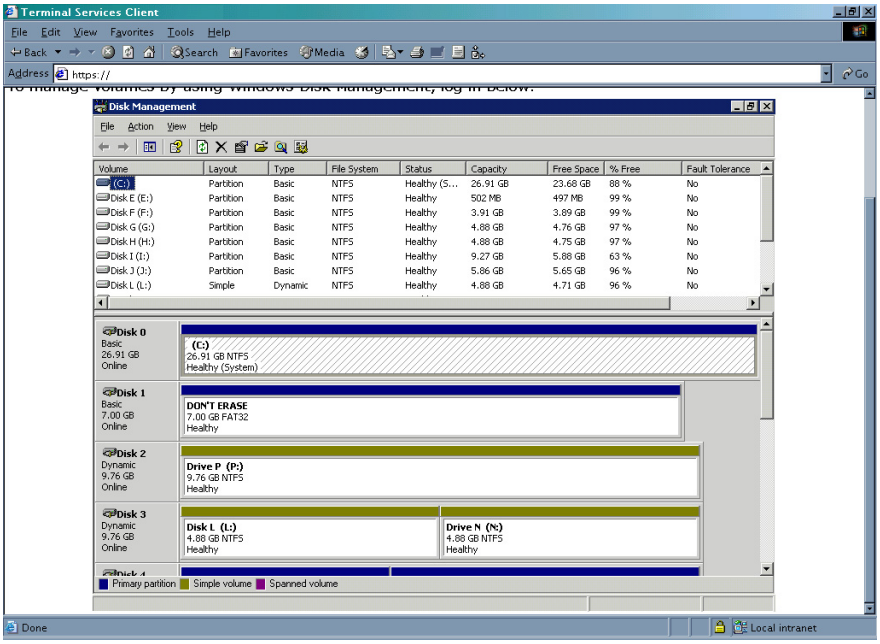

Terminal Services Client
File Edit View Favorites Tools Help
Address https://
Disk Management
File Action View Help
Volume Layout Type File System Status Capacity Free Space % Free Fault Tolerance
Disk 0 Basic 26.91 GB Online
(C:) 26.91 GB NTFS Healthy (System)
Disk 1 Basic 7.00 GB Online
DON'T ERASE 7.00 GB FAT32 Healthy
Disk 2 Dynamic 9.76 GB Online
Drive P (P:) 9.76 GB NTFS Healthy
Disk 3 Dynamic 9.76 GB Online
Disk L (L:) 4.88 GB NTFS Healthy
Drive N (N:) 4.88 GB NTFS Healthy
Primary partition Simple volume Spanned volume
Done
Local intranet

Figure 31: Disk Management utility

Note: When the Disk Management utility is accessed, the Remote Desktop connection assumes a dedicated mode and can only be used to manage disks and volumes on the server. Navigating to another page during an open session closes the session.

Note: It may take a few moments for the Remote Desktop Connection session to log off when closing Disk Management.

Disk Management Guidelines

When managing disks and volumes:

- Read the online Disk Manager Help found in the utility.
- Do not alter the Operating System Disk Labeled Local Disk C:.
- Do not alter the disk labeled “DON’T ERASE.”
- The use of software RAID-based dynamic volumes is not recommended; use the array controller instead, it is more efficient.
- The largest disk that Windows 2003 Storage Server can accommodate from a storage system is 2 TB.
- It is not recommended to span array controllers with dynamic volumes.
- Use meaningful volume labels with the intended drive letter embedded in the volume label, if possible. For example, volume e: might be named “Disk E:.” Volume labels often serve as the only means of identification.
- Record all volume labels and drive letters in case of system Quick Restore. See “Managing Disks After Quick Restore” later in this chapter.

- When managing basic disks, only the last partition on the disk can be extended unless the disk is changed to dynamic.
- Basic disks can be converted to dynamic without bringing the system offline or loss of data, but the volume will be unavailable during the conversion.
- Basic disks can contain up to four primary partitions (or three primary partitions and one extended partition).
- Format drives with a 16 K allocation size for best support of snapshots, performance, and defragmentation.
- NTFS formatted drives are recommend since they provide the greatest level of support for snapshots, encryption, and compression.
- Only basic disks can be formatted as FAT or FAT32.

Volumes Page

On the Volumes page, administrators can select to manage volumes, schedule defragmentation, and set or manage quotas. The Volumes page displays all volumes that are formatted NTFS on the system. It does not display the volume type (for example simple or spanned) nor volumes that are FAT32 or FAT. To display these types of volumes, click the **Manage** or **Advanced Disk Management** buttons.

See the Managed Disks page to view a list of disks, and the volumes assigned to them. The drive letters for volumes that encompass multiple disks appear on multiple rows on the display. For an example, see the volume labeled H: in Figure 30.

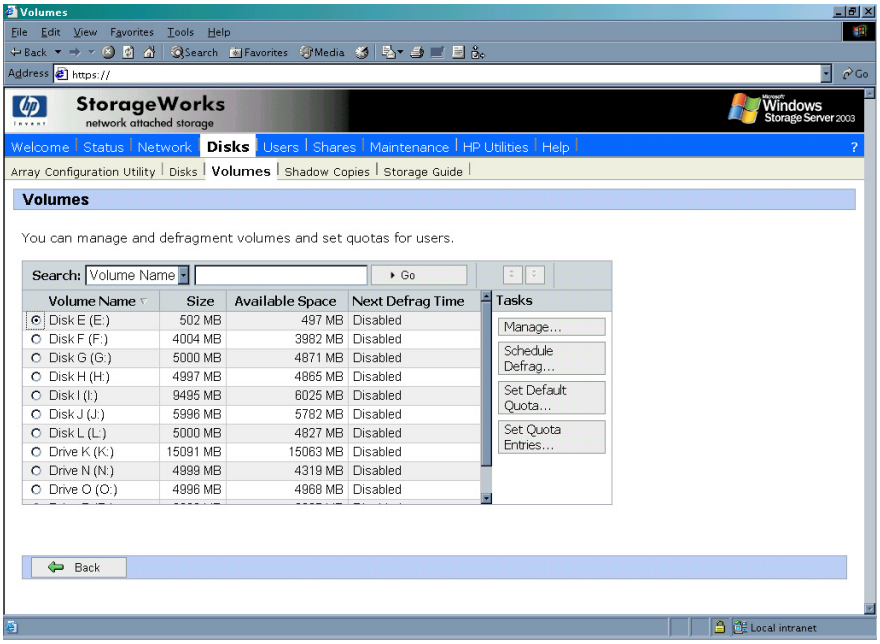

Volumes
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help
Array Configuration Utility | Disks | Volumes | Shadow Copies | Storage Guide
Volumes
You can manage and defragment volumes and set quotas for users.
Search: Volume Name Go
Volume Name | Size | Available Space | Next Defrag Time
Disk E (E:) 502 MB 497 MB Disabled
Disk F (F:) 4004 MB 3982 MB Disabled
Disk G (G:) 5000 MB 4871 MB Disabled
Disk H (H:) 4997 MB 4865 MB Disabled
Disk I (I:) 9495 MB 6025 MB Disabled
Disk J (J:) 5996 MB 5782 MB Disabled
Disk L (L:) 5000 MB 4827 MB Disabled
Drive K (K:) 15091 MB 15063 MB Disabled
Drive N (N:) 4999 MB 4319 MB Disabled
Drive O (O:) 4996 MB 4968 MB Disabled
Tasks
Manage...
Schedule Defrag...
Set Default Quota...
Set Quota Entries...
Back
Local intranet

Figure 32: Volumes tab

Table 6: Volumes Page Object/Task Selector

Option	Task
Manage...	Select to display the Manage Volumes screen.
Schedule Defrag...	Select to schedule defragmentation for the selected volume.
Set Default Quota	Select to set quota limits to manage use of the volume. Settings on this page apply to new users and any users for whom user quota entries have not previously been set.
Set Quota Entries	Select to show a list of user quota entries. Then create a new quota entry, delete a quota entry, or view the properties of a quota entry.

Managing Volumes

To manage volumes on the server:

1. On the primary navigation bar, click **Disks**.
2. Click **Volumes**.
3. Select the volume to manage.
4. In the Tasks list, click **Manage**.

The Manage Volumes screen is displayed. The Manage Volumes page displays all volumes on the NAS device regardless of their format (NTFS, FAT, or FAT32). Do not tamper with the "Don't Erase" or the Local C: volume. These are reserved volumes and must be maintained as they exist.

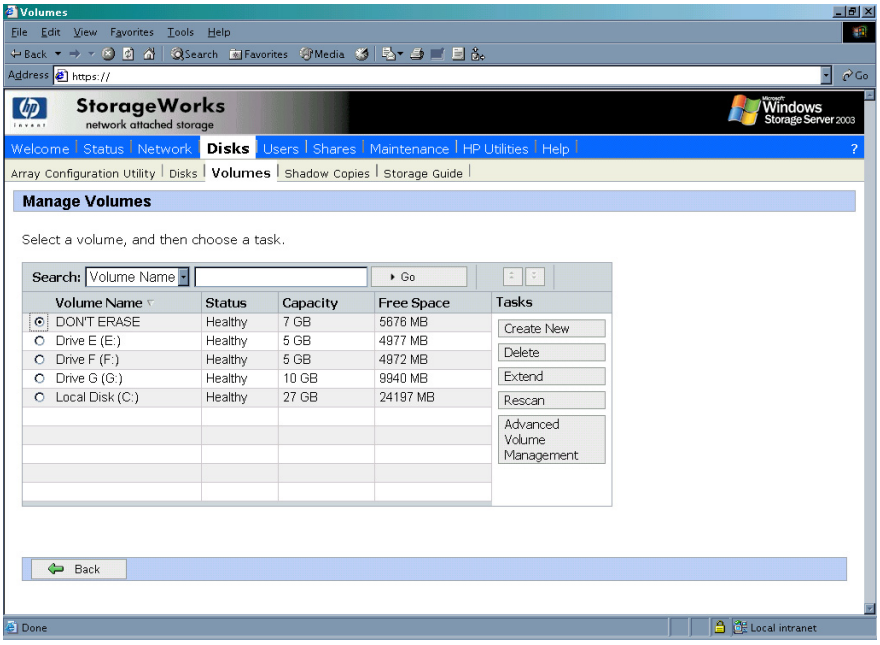

Volumes
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Array Configuration Utility Disks Volumes Shadow Copies Storage Guide
Manage Volumes
Select a volume, and then choose a task.
Search: Volume Name Go
Volume Name Status Capacity Free Space Tasks
DON'T ERASE Healthy 7 GB 5676 MB
Drive E (E:) Healthy 5 GB 4977 MB
Drive F (F:) Healthy 5 GB 4972 MB
Drive G (G:) Healthy 10 GB 9940 MB
Local Disk (C:) Healthy 27 GB 24197 MB
Create New
Delete
Extend
Rescan
Advanced Volume Management
Back
Done
Local intranet

Figure 33: Manage Volumes screen

Table 7: Manage Volumes Options

Option	Task
Create New	Select to open the Disk Utility and create a new volume. Create a new volume will open a remote desktop session to the Windows Disk Manager
Delete	Select to delete the selected volume. This is data destructive and there is no recovery other than from tape.

Table 7: Manage Volumes Options (Continued)

Option	Task
Extend	Opens a page to extend a partition based on a basic disk or it opens Windows Disk Management to extend dynamic based volumes.
Rescan	Select to detect a volume or partition added to the system or to update the size of a volume that has undergone expansion. The rescan is not synchronous and may require a browser refresh after the scan is initiated to display the new content.
Advanced Volume Management	Select to open the Windows Disk Manager and perform advanced volume management tasks.

Dynamic Growth

Dynamic growth is a feature of the NAS 2000s, which provides for growth of a volume or partition to meet expanding storage requirements without the need to take volumes offline or incur downtime. Growth may occur in three forms:

- Extend unallocated space from original LUNS.
- Alter LUNs to contain additional storage.
- Add new LUNS to the system. The additional space is then extended into through a variety of means depending on which type of disk structure is in use.

Expanding a LUN

Expanding an existing LUN is accomplished via the Array Configuration Utility presented on the Disk page. LUN expansion may occur in Disk Arrays where space is available. If insufficient space is available, additional physical disks may be added to the array dynamically.

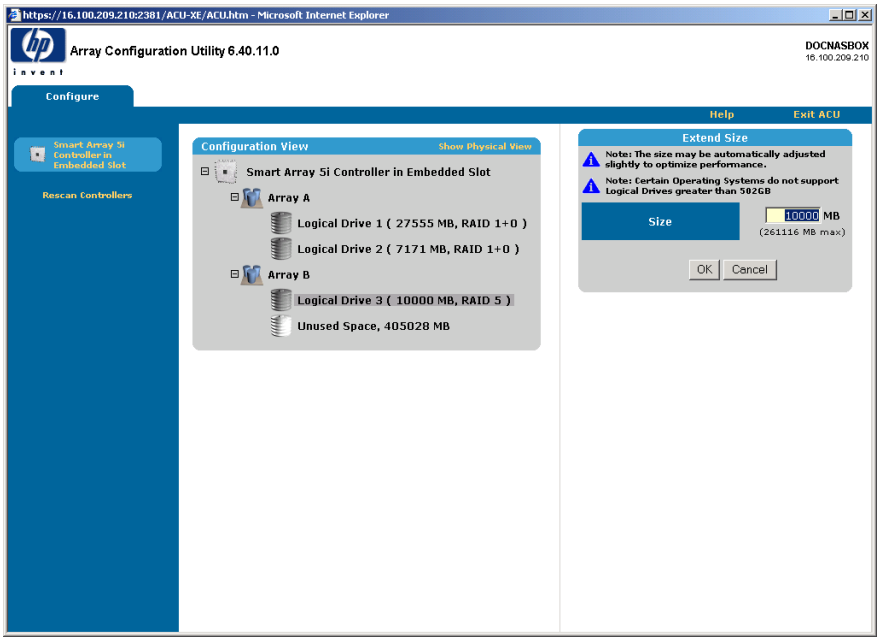

https://16.100.209.210:2381/ACU-XE/ACU.htm - Microsoft Internet Explorer
Array Configuration Utility 6.40.11.0
DOCNASBOX
16.100.209.210
Configure
Help
Exit ACU
Smart Array 5i Controller in Embedded Slot
Rescan Controllers
Configuration View
Show Physical View
Smart Array 5i Controller in Embedded Slot
Array A
Logical Drive 1 (27555 MB, RAID 1+0)
Logical Drive 2 (7171 MB, RAID 1+0)
Array B
Logical Drive 3 (10000 MB, RAID 5)
Unused Space, 405028 MB
Extend Size
Note: The size may be automatically adjusted slightly to optimize performance.
Note: Certain Operating Systems do not support Logical Drives greater than 502GB
Size
10000 MB
(261116 MB max)
OK
Cancel

Figure 34: Expanding a LUN

To extend a LUN where space is available in the array:

1. Click the **Disks** tab.
2. Click **Array Configuration Utility** and log in.
3. Select the appropriate array controller and the appropriate array that the logical drive is contained in.
4. Select the appropriate logical drive.
5. Select **Extend Size**.
6. Enter the total size of the logical drive in MB (not just the amount to be added) and click **OK**.
7. Click **Save** to update the configuration.
8. Close the ACU.

To extend a LUN where space is not available in the array

1. Add an unassigned physical disk to the array using the ACU. If an unassigned physical disk is unavailable, add a new disk to the appropriate storage device and select **Refresh**.
2. To add an unassigned physical disk to the array use the following steps:
   a. Select the appropriate array controller and the appropriate array that the logical drive is contained in.
   b. Select **Expand Array**.
   c. Select the appropriate physical disk and click **OK**. The array is expanded.
3. Follow the instructions for extending a LUN.

Extending a partition on a basic disk

Partitions can be extended using either the WebUI extend function from the Managed Volumes page extend selection or by using the DiskPart command line utility. The Windows Disk Manager cannot extend basic disk partitions. To extend a partition using the WebUI follow the steps below:

1. Click the **Disks** tab.
2. Click the **Volumes** tab.
3. Click **Manage**.
4. Select the Volume to extend and click **Extend**.
5. The page in Figure 35 is displayed. Enter in the amount to extend the partition.

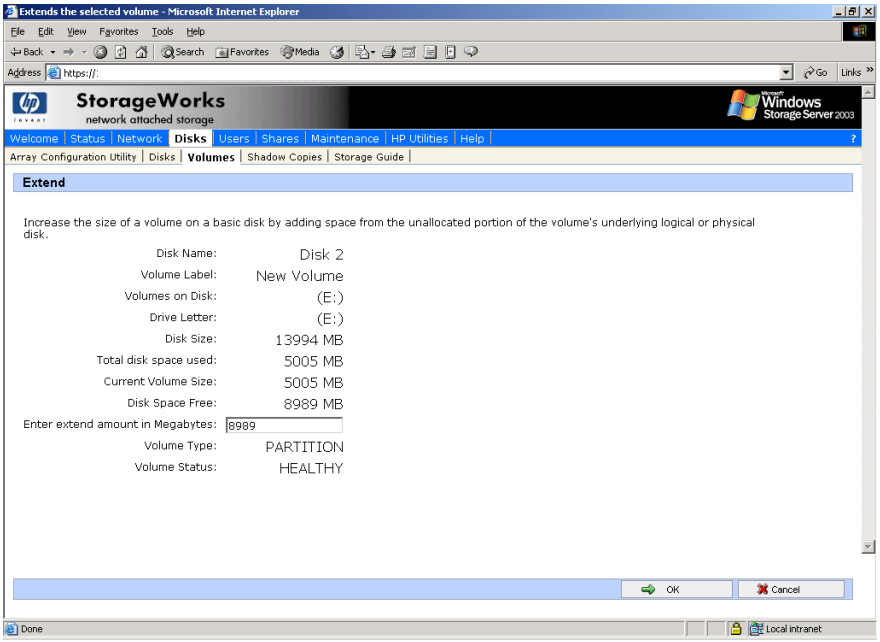

Extends the selected volume - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://:
Go Links
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Array Configuration Utility Disks Volumes Shadow Copies Storage Guide
Extend
Increase the size of a volume on a basic disk by adding space from the unallocated portion of the volume's underlying logical or physical disk.
Disk Name: Disk 2
Volume Label: New Volume
Volumes on Disk: (E:)
Drive Letter: (E:)
Disk Size: 13994 MB
Total disk space used: 5005 MB
Current Volume Size: 5005 MB
Disk Space Free: 8989 MB
Enter extend amount in Megabytes: 8989
Volume Type: PARTITION
Volume Status: HEALTHY
OK
Cancel
Done
Local intranet

Figure 35: Extending a volume

Extending a Volume on Dynamic Disks

The WebUI allows for the extension of volumes based on a dynamic disk or a set of dynamic disks. To extend a volume perform the following steps:

1. Click the **Disks** tab.
2. Click the **Volumes** tab.
3. Click **Manage**.
4. Select the volume to extend and select **Extend**. A remote session to Disk Manager is started.
5. To extend a given volume, right-click on the desired volume and select **Extend**.
6. Enter the amount to extend the volume. If no more space is available on the current dynamic disk, add an additional dynamic disk to the list of available disks and utilize space from it.

Extending using DiskPart

DiskPart may also be used to extend a partition or volume from the CMD prompt of the NAS operating system via Remote Desktop. Complete help is available from the Windows 2003 desktop under **Start > Help and Support**. To use DiskPart follow the steps below:

Connect to the box through remote desktop, login, and select the command prompt icon.

1. Type `Diskpart`.
2. From the Diskpart prompt type the following commands:
   - Type `list` to display all of the volumes
   - Type `select [name of volume]` (for example `select Volume 4`) to work against a particular volume or partition.

- Type `Extend`. The volume is extended to the capacity of the underlying disk. To specify the amount to extend or to extend to another disk, type `extend [size=N] [disk=N]`

  Size is in MB.
- Type `exit` to exit the utility.

Scheduling Defragmentation

Defragmentation is the process of analyzing local volumes and consolidating fragmented files and folders so that each occupies a single, contiguous space on the volume. This allows the system to access files and folders and save new ones more efficiently. Because defragmentation consolidates files and folders, it also consolidates the free space on a volume. This reduces the likelihood that new files will be fragmented.

Defragmentation for a volume can be scheduled to occur automatically at convenient times. Defragmentation can also be done once, or on a recurring basis.

To schedule defragmentation for a volume:

1. On the primary navigation bar, choose **Disks**.
2. Click the **Volumes** tab.
3. Select the volume to schedule defragmentation.
4. In the Tasks list, choose **Schedule Defrag**.
5. On the **Manage the defragmentation schedule for [VolumeName]** page, select the **Schedule defragmentation for this volume** check box.
6. Select the frequency: Once, Weekly, or Monthly.
7. Use the remaining controls to specify when defragmentation will occur. The available controls change according to the frequency that is selected.
8. Click **OK**.

To disable defragmentation for a volume:

1. On the primary navigation bar, click **Disks**.
2. Click **Volumes**.
3. Select the volume to disable defragmentation.
4. In the Tasks list, choose **Schedule Defrag**.
5. On the **Manage the defragmentation schedule for [VolumeName]** page, clear the **Schedule defragmentation for this volume** check box.
6. Click **OK**.

Note: Scheduling defragmentation to run no later than a specific time prevents the defragmentation process from running later than that time. If the defragmentation process is running when the time is reached, the process is stopped. This setting is useful to ensure that the defragmentation process ends before the demand for server access is likely to increase.

If defragmenting volumes on which shadow copies are enabled, use a cluster (or allocation unit) size of 16 KB or larger during the format. Otherwise defragmentation registers as a change by the Shadow Copy process. This increase in the number of changes forces Shadow Copy to delete snapshots as the limit for the cache file is reached.

Caution: Allocation unit size cannot be altered without reformatting the drive. Data on a reformatted drive cannot be recovered.

Note: NTFS compression is supported only if the cluster size is 4 KB or smaller.

Managing Disks After Quick Restore

After a Quick Restore, drive letters may be assigned to the wrong volume. Windows Storage Server 2003 assigns drive letters after the restoration in the order of discovery. To help maintain drive letter information, placing the drive letter into the volume label is recommended. To change the drive letters to the appropriate ones, go into Disk Management and perform the following steps for each volume.

1. Right-click the on the volume that needs to be changed.
2. Select **Change Drive Letter and Paths**.
3. In the Change Drive Letter and Paths dialog box, select **Change**.

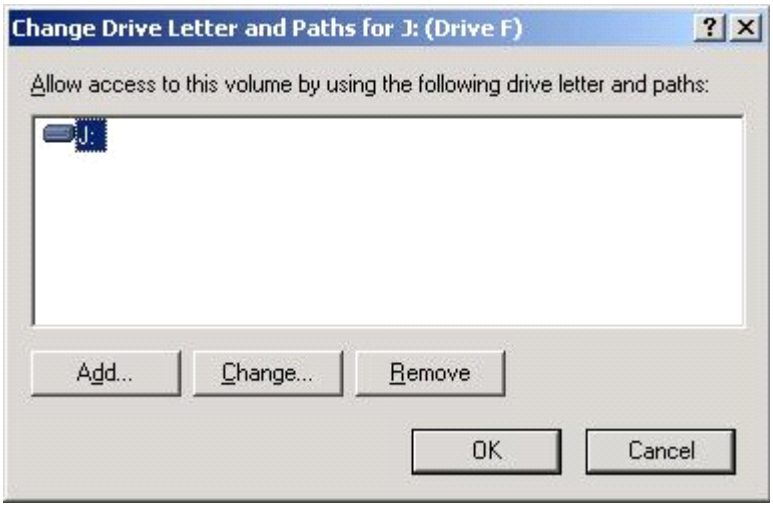


Figure 36: Change Drive Letter and Paths dialog box

4. In the Change Drive Letter or Path dialog box, select the appropriate drive letter and then click **OK**.

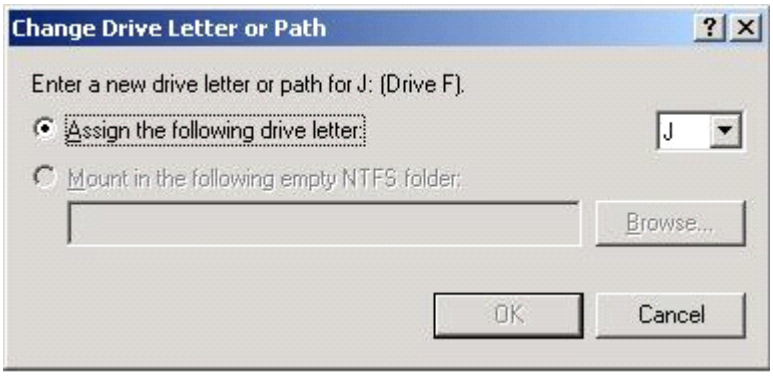

Change Drive Letter or Path
Enter a new drive letter or path for J: (Drive F).
Assign the following drive letter:
J
Mount in the following empty NTFS folder:
Browse...
OK
Cancel

Figure 37: Enter new drive letter

5. Click **Yes** to confirm the drive letter change.

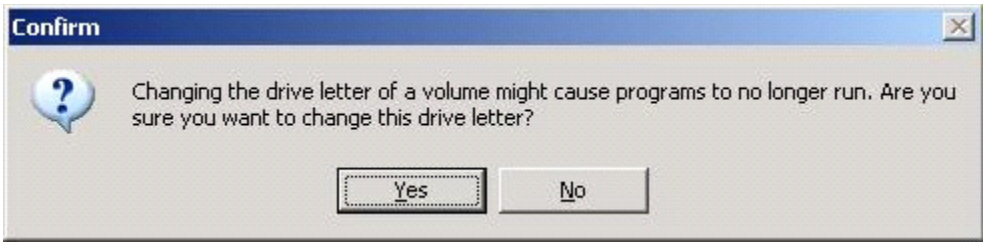

Confirm
Changing the drive letter of a volume might cause programs to no longer run. Are you sure you want to change this drive letter?
Yes
No

Figure 38: Confirm drive letter change

6. If the dialog box in Figure 39 is displayed, select **Yes** to continue. If the old drive letter needs to be reused, reboot the server after clicking **Yes**.

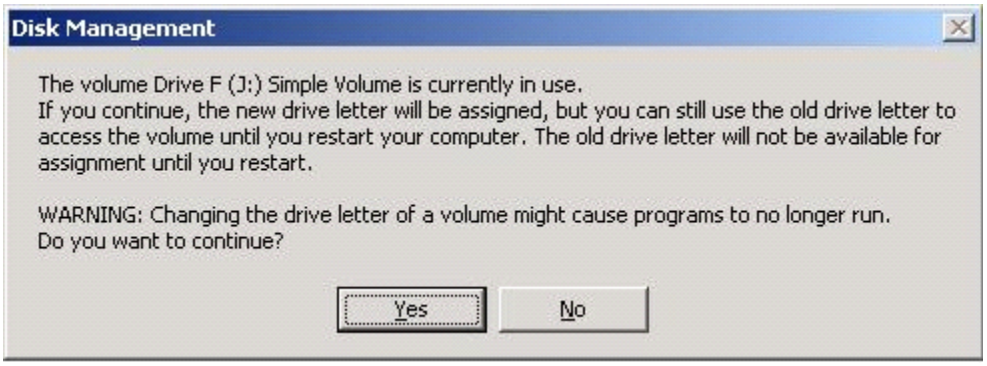

Disk Management
The volume Drive F (J:) Simple Volume is currently in use.
If you continue, the new drive letter will be assigned, but you can still use the old drive letter to access the volume until you restart your computer. The old drive letter will not be available for assignment until you restart.
WARNING: Changing the drive letter of a volume might cause programs to no longer run.
Do you want to continue?
Yes
No

Figure 39: Disk Management warning

Disk Quotas

Disk quotas track and control disk space use in volumes.

Note: To limit the size of a folder or share, see "Directory Quotas" in Chapter 7.

Configure the volumes on the server to perform the following tasks:

- Prevent further disk space use and log an event when a user exceeds a specified disk space limit.
- Log an event when a user exceeds a specified disk space warning level.

When enabling disk quotas, it is possible to set both the disk quota limit and the disk quota warning level. The disk quota limit specifies the amount of disk space a user is allowed to use. The warning level specifies the point at which a user is nearing his or her quota limit. For example, a user's disk quota limit can be set to 50 megabytes (MB), and the disk quota warning level to 45 MB. In this case, the user can store no more than 50 MB on the volume. If the user stores more than 45 MB on the volume, the disk quota system logs a system event.

In addition, it is possible to specify that users can exceed their quota limit. Enabling quotas and not limiting disk space use is useful to still allow users access to a volume, but track disk space use on a per-user basis. It is also possible to specify whether or not to log an event when users exceed either their quota warning level or their quota limit.

When enabling disk quotas for a volume, volume usage is automatically tracked from that point forward, but existing volume users have no disk quotas applied to them. Apply disk quotas to existing volume users by adding new quota entries on the Quota Entries page.

Enabling Quota Management

When enabling disk quotas on a volume, every user's disk volume usage is monitored and treated differently, depending on the quota management settings for the specific user.

To enable quota management on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click **Volumes**.
3. Select the volume to manage.
4. In the Tasks list, click **Set Default Quota**.
5. On the Default Quota for volume page, select **Use quota limits to manage use of the volume**.
6. If desired, select **Deny disk space to users exceeding quota limit** to enable that restriction.
7. Specify the default quota limit and warning level for new users on this volume.
8. Specify which quota events should be logged.
9. Click **OK**.

Note: When enabling disk quotas on a volume, any users with write access to the volume who have not exceeded their quota limit can store data on the volume. The first time a user writes data to a quota-enabled volume, default values for disk space limit and warning level are automatically assigned by the quota system.

To disable quota management on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click **Volumes**.
3. Select the volume to manage.
4. In the Tasks list, click **Set Default Quota**.
5. On the Default Quota for (volume) page, clear the check box to **Use quota limits to manage use of the volume**.
6. Click **OK**.

Setting User Quota Entries

The Set User Quotas page allows the administrator to set, delete, or change disk quotas for any user on the server. To set or change quota entries on the server:

1. On the primary navigation bar, click **Disks**.
2. Click **Volumes**.
3. Select the volume to manage.
4. From the Tasks list, click **Set Quota Entries**.

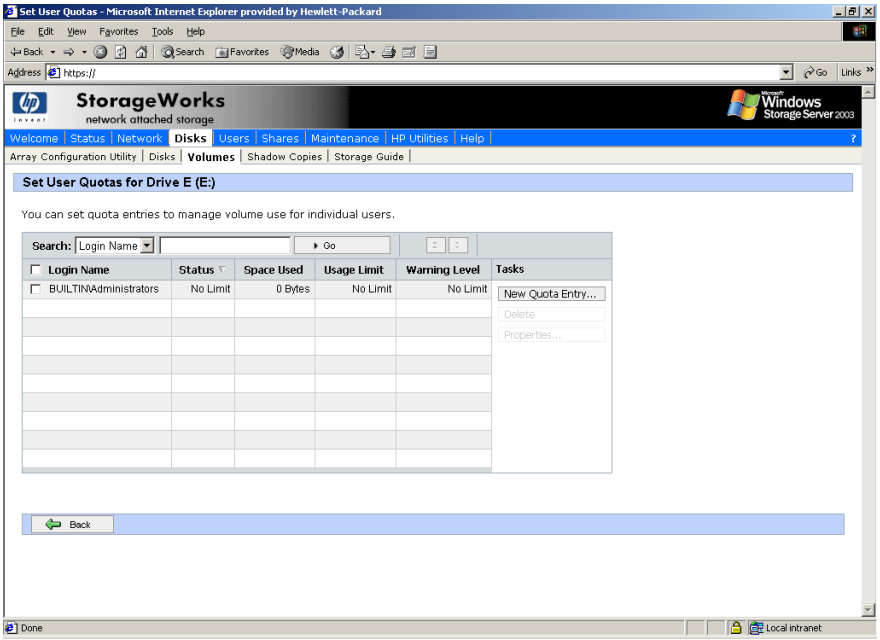

Set User Quotas - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Array Configuration Utility Disks Volumes Shadow Copies Storage Guide
Set User Quotas for Drive E (E:)
You can set quota entries to manage volume use for individual users.
Search: Login Name Go
Login Name Status Space Used Usage Limit Warning Level Tasks
BUILTIN\Administrators No Limit 0 Bytes No Limit No Limit
New Quota Entry...
Delete
Properties...
Back
Done
Local intranet

Figure 40: Setting user quotas

To create a new user quota entry:

1. Click **New Quota Entry**.
2. Select a user.
3. Set the limit.
4. Set the warning level.
5. Click **OK**.

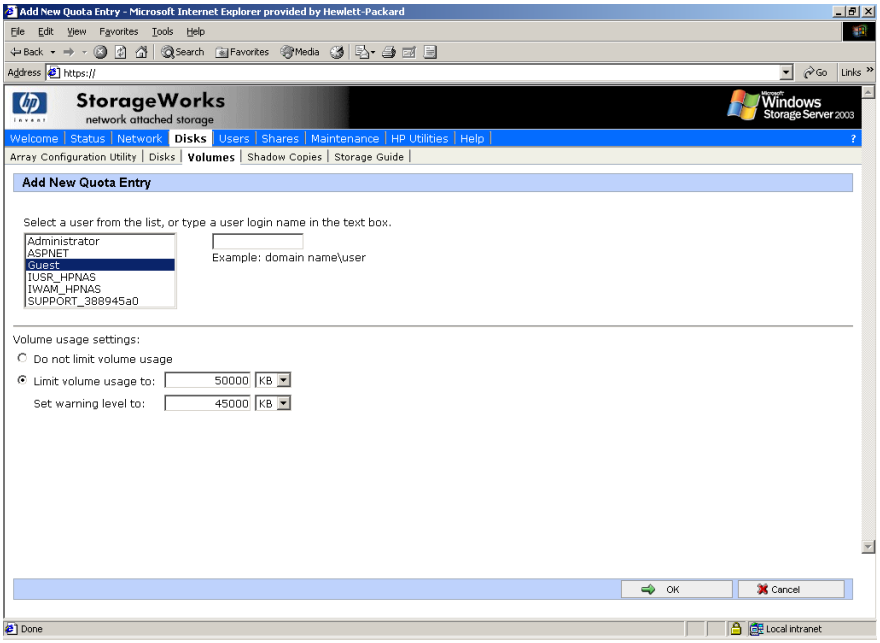


Figure 41: Add new quota entry

To change a quota entry:

1. Select the quota to change.
2. Click **Properties**.
3. Change the limit.
4. Change the warning level.
5. Click **OK**.

To delete a quota entry:

1. Select the quota to change.
2. Click **Delete**.

DiskPart

DiskPart.exe is a text-mode command interpreter that enables the administrator to manage disks, partitions, or volumes.

When using the list commands, an asterisk (*) appears next to the object with focus. Select an object by its number or drive letter, such as disk 0, partition 1, volume 3, or volume C.

When selecting an object, the focus remains on that object until a different object is selected. For example, if the focus is set on disk 0 and volume 8 on disk 2 is selected, the focus shifts from disk 0 to disk 2, volume 8. Some commands automatically change the focus. For example, when creating a new partition, the focus automatically switches to the new partition.

Focus can only be given to a partition on the selected disk. When a partition has focus, the related volume (if any) also has focus. When a volume has focus, the related disk and partition also have focus if the volume maps to a single specific partition. If this is not the case, focus on the disk and partition is lost.

Table 8: Common DiskPart Commands

Command	Description
`add disk`	Mirrors the simple volume with focus to the specified disk.
`assign`	Assigns a drive letter or mount point to the volume with focus.
`convert basic`	Converts an empty dynamic disk to a basic disk.
`convert dynamic`	Converts a basic disk into a dynamic disk. Any existing partitions on the disk become simple volumes.
`create volume simple`	Creates a simple volume. After creating the volume, the focus automatically shifts to the new volume.
`exit`	Exits the DiskPart command interpreter.
`help`	Displays a list of the available commands.
`list disk`	Displays a list of disks and information about them, such as their size, amount of available free space, whether the disk is a basic or dynamic disk, and whether the disk uses the master boot record (MBR) or GUID partition table. The disk marked with an asterisk (*) has focus.
`list partition`	Displays the partitions listed in the partition table of the current disk. On dynamic disks these partitions may not correspond to the dynamic volumes on the disk. This discrepancy occurs because dynamic disks contain entries in the partition table for the system volume or boot volume (if present on the disk). They also contain a partition that occupies the remainder of the disk in order to reserve the space for use by dynamic volumes.
`list volume`	Displays a list of basic and dynamic volumes on all disks.
`rem`	Provides a way to add comments to a script.
`retain`	Prepares an existing dynamic simple volume to be used as a boot or system volume.
`select disk`	Selects the specified disk and shifts the focus to it.

For a complete list of DiskPart commands, go to the Windows 2003 Desktop on the NAS device via Remote Desktop and select **Start >Help and Support**, search on DiskPart.

Example of using DiskPart

The following example shows how to configure a volume on the NAS server.

In the cmd window, type:

```
c:\>diskpart
DISKPART>Rescan
DISKPART>select disk 2
DISKPART>convert dynamic
DISKPART>REM Create a simple volume
DISKPART>create volume simple size=4000
DISKPART> REM Assign drive letter E: to the volume
DISKPART>assign letter=E
DISKPART>list vol
DISKPART>Exit
```

Shadow Copies

5

Overview

The Volume Shadow Copy Service provides an infrastructure for creating point-in-time snapshots (shadow copies) of volumes. Shadow Copy supports 64 shadow copies per volume.

A shadow copy contains previous versions of the files or folders contained on a volume at a specific point in time. While the Shadow Copy mechanism is managed at the server (see the "Managing Shadow Copy" section in this chapter), previous versions of files and folders are only available over the network from clients and are seen on a per folder or file level and not as an entire volume.

The Shadow Copy feature works at the block level. As changes are made to the file system, the Shadow Copy Service copies out the original blocks to a special cache file, to maintain a consistent view of the file at a particular point in time. Since the snapshot only contains a subset of the original blocks, the cache file is typically smaller than the original volume. In the snapshot's original form, it takes up no space since blocks are not moved until an update to the disk occurs.

By using shadow copies, a NAS 2000s server can maintain a set of previous versions of all files on the selected volumes. End users access the file or folder by using a separate client add-on program, which enables them to view the file in Windows Explorer. Accessing previous versions of files, or shadow copies, enables users to:

- Recover files that were accidentally deleted. Previous versions can be opened and copied to a safe location.
- Recover from accidentally overwriting a file. A previous version of that file can be accessed.
- Compare several versions of a file while working. Use previous versions to compare changes between two versions of a file.

Shadow copies cannot replace the current backup, archive, or business recovery system, but they can help to simplify restore procedures. Since a snapshot only contains a portion of the original data blocks, shadow copies can not protect against data loss due to media failures. However the strength of snapshots is the ability to instantly recover data from shadow copies, reducing the number of times needed to restore data from tape.

Shadow Copy Planning

Before setup is initiated on the server and the client interface is made available to end users, consider the following:

- From what volume will shadow copies be taken?
- How much disk space should be allocated for shadow copies?
- Will separate disks be used to store shadow copies?
- How frequently will shadow copies be made?

Identifying the Volume

Shadow copies are taken for a complete volume, but not for a specific directory. Shadow copies work best when the server stores user files, such as documents, spreadsheets, presentations, graphics, or database files.

Note: Shadow copies should not be used to provide access to previous versions of application or e-mail databases.

Shadow copies are designed for volumes that store user data such as home directories and My Documents folders that are redirected by using Group Policy or other shared folders in which users store data.

Shadow copies work with compressed or encrypted files and retain whatever permissions were set on the files when the shadow copies were taken. For example, if a user is denied permission to read a file, that user would not be able to restore a previous version of the file, or be able to read the file after it has been restored.

Although shadow copies are taken for an entire volume, users must use shared folders to access shadow copies. Administrators on the local server must also specify the *servername**sharename* path to access shadow copies. If administrators or end users want to access a previous version of a file that does not reside in a shared folder, the administrator must first share the folder.

Note: Shadow copies are available only on NTFS, not FAT or FAT32 volumes.

Files or folders that are recorded by using Shadow Copy appear static, even though the original data is changing.

Allocating Disk Space

When shadow copies are enabled on a volume, the maximum amount of volume space to be used for the shadow copies can be specified. The default limit is 10 percent of the source volume (the volume being copied). The limit for volumes in which users frequently change files should be increased. Also, note that setting the limit too low causes the oldest shadow copies to be deleted frequently, which defeats the purpose of shadow copies and frustrates users.

If the frequency of changes to each file is greater than the amount of space allocated to storing shadow copies, then no shadow copy is created. Therefore, administrators should carefully consider the amount of disk space they want to set aside for shadow copies, and keep in mind user expectations of how many versions they will want to have available. End users might expect only a single shadow copy to be available, or they might expect three days or three weeks worth of shadow copies. The more shadow copies users expect, the more storage space administrators must allocate for storing them.

Setting the limit too low also affects Backup and other backup programs that use shadow copy technology because these programs are also limited to using the amount of disk space specified by administrators.

Note: Regardless of the volume space that is allocated for shadow copies, there is a maximum of 64 shadow copies for any volume. When the 65th shadow copy is taken, the oldest shadow copy is purged.

The minimum amount of storage space that can be specified is 100 megabytes (MB). The default storage size is 10% of the source volume (the volume being copied). If the shadow copies are stored on a separate volume, change the default to reflect the space available on the storage volume instead of the source volume. Remember that when the storage limit is reached, older versions of the shadow copies are deleted and cannot be restored.

When determining the amount of space to allocate for storing shadow copies, consider both the number and size of files that are being copied, as well as the frequency of changes between copies. For example, 100 files that only change monthly require less storage space than 10 files that change daily.

To change the storage volume, shadow copies must be deleted. The existing file change history that is kept on the original storage volume is lost. To avoid this problem, verify that the storage volume that is initially selected is large enough.

When using a basic disk as a storage area for shadow copies and converting the disk into a dynamic disk, it is important to take the following precaution to avoid data loss:

- If the disk is a non-boot volume and is a different volume from where the original files reside, first dismount and take offline the volume containing the original files before converting the disk containing shadow copies to a dynamic disk.
- The volume containing the original files must be brought back online within 20 minutes, otherwise, the data stored in the existing shadow copies is lost.
- If the shadow copies are located on a boot volume, the disk to can be converted to dynamic without losing shadow copies.

Note: Use the mountvol command with the /p option to dismount the volume and take it offline. Mount the volume and bring it online using the mountvol command or the Disk Management snap-in.

Identifying the Storage Area

To store the shadow copies of another volume on the same file server, a volume can be dedicated on separate disks. For example, if user files are stored on *H:*\, another volume such as *S:*\ can be used to store the shadow copies. Using a separate volume on separate disks provides better performance and is recommended for heavily used NAS devices.

If a separate volume will be used for the storage area (where shadow copies are stored), the maximum size should be changed to **No Limit** to reflect the space available on the storage area volume instead of the source volume (where the user files are stored).

Disk space for shadow copies can be allocated on either the same volume as the source files or a different volume. There is, however, a trade-off between ease of use and maintenance versus performance and reliability that the system administrator must consider.

For example, by keeping the shadow copy on the same volume, although there is a potential gain in ease of setup and maintenance, there may be a reduction in performance and reliability.

Caution: If shadow copies are stored on the same volume as the user files, note that a burst of disk input/output (I/O) can cause all shadow copies to be deleted. If the sudden deletion of shadow copies is unacceptable to administrators or end users, it is best to use a separate volume on separate disks to store shadow copies.

Determining Creation Frequency

The more frequently shadow copies are created, the more likely that end users will get the version that they want. However, with a maximum of 64 shadow copies per volume, there is a trade-off between the frequency of making shadow copies and the amount of time that the earlier files will be available.

By default, the NAS 2000s will create shadow copies at 0700 and 1200, Monday through Friday when the feature is enabled for a volume. However, these settings are easily modified by the administrator so that the shadow copy schedule can better accommodate end user needs. To modify these schedules see the section on “Shadow Copy Schedules” documented later in this chapter.

Note: The more shadow copies are created, the more disk space the shadow copies can consume, especially if files change frequently.

Shadow Copies and Drive Defragmentation

When running Disk Defragmenter on a volume with shadow copies activated, all or some of the shadow copies may be lost, starting with the oldest shadow copies.

If defragmenting volumes on which shadow copies are enabled, use a cluster (or allocation unit) size of 16 KB or larger. Utilizing this allocation unit size reduces the number of copy outs occurring on the snapshot. Otherwise the number of changes caused by the defragmentation process can cause shadow copies to be deleted faster than expected. Note, however, that NTFS compression is supported only if the cluster size is 4 KB or smaller.

Note: To check the cluster size of a volume, use the `fsutil fsinfo ntfsinfo` command. To change the cluster size on a volume that contains data, backup the data on the volume, reformat it using the new cluster size, and then restore the data.

Mounted Drives

A mounted drive is a local volume attached to an empty folder (called a mount point) on an NTFS volume. When enabling shadow copies on a volume that contains mounted drives, the mounted drives are not included when shadow copies are taken. In addition, if a mounted drive is shared and shadow copies are enabled on it, users cannot access the shadow copies if they traverse from the host volume (where the mount point is stored) to the mounted drive.

For example, assume there is a folder *E:\data\users*, and the *Users* folder is a mount point for *F:*. If shadow copies are enabled on both *E:* and *F:*, *E:\data* is shared as *server1**data*, and *E:\data\users* is shared as *server1**users*. In this example, users can access previous versions of *server1**data* and *server1**users* but not *server1**data**users*.

Managing Shadow Copies

From the **WebUI Welcome** screen, click **Disks**, then **Shadow Copies** to display the Shadow Copies screen.

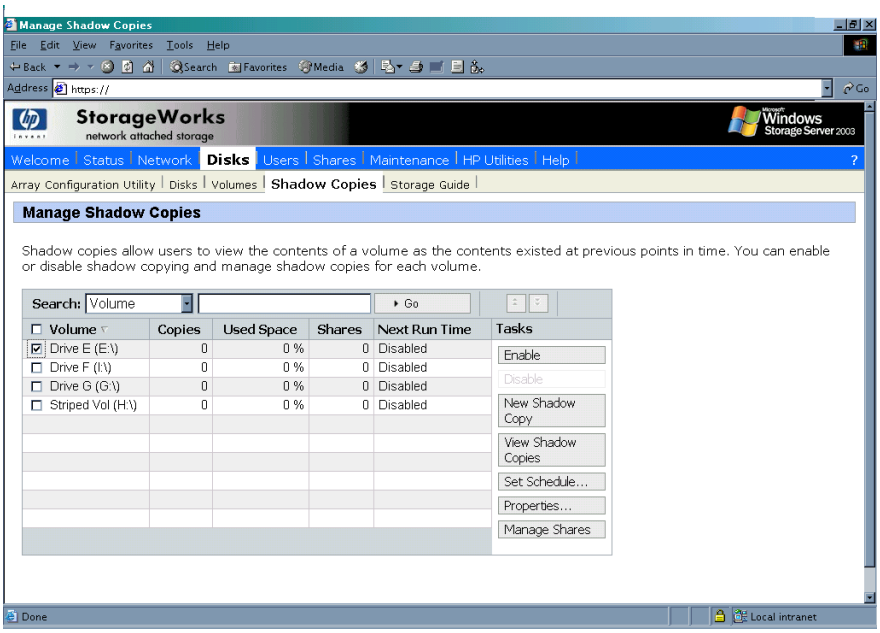

Manage Shadow Copies
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help
Array Configuration Utility | Disks | Volumes | Shadow Copies | Storage Guide
Manage Shadow Copies
Shadow copies allow users to view the contents of a volume as the contents existed at previous points in time. You can enable or disable shadow copying and manage shadow copies for each volume.
Search: Volume
Go
Volume
Copies
Used Space
Shares
Next Run Time
Tasks
Drive E (E:\) 0 0 % 0 Disabled
Drive F (I:\) 0 0 % 0 Disabled
Drive G (G:\) 0 0 % 0 Disabled
Striped Vol (H:\) 0 0 % 0 Disabled
Enable
Disable
New Shadow Copy
View Shadow Copies
Set Schedule...
Properties...
Manage Shares
Done
Local intranet

Figure 42: Shadow Copies screen

Table 9: Shadow Copies Fields

Field	Description
Volume	Lists all volumes of the server on which the Shadow Copies service can be used. Only NTFS file system data volumes that are physically located on the server can support shadow copies. To manage shadow copies on a volume, select the check box next to the volume name, and then choose a task from the Tasks list.
Copies	Lists the number of shadow copies on the volume.
Used Space	Lists the total disk space that is used by the shadow copies on the volume.
Shares	Lists the number of shared folders that reside on the volume. This information can help determine whether to enable shadow copies on a volume. A greater number of shared folders on a volume increases the likelihood that users might need access to previous versions of their data.
Next Run Time	If the Shadow Copies service is enabled on the volume, this column lists the time and date the next shadow copy will be created. Otherwise, it displays Disabled.

Table 10: Shadow Copies Tasks

Task	Description
Enable	Click to enable Shadow Copies on the selected volume.
Disable	Click to enable Shadow Copies on the selected volume.
New Shadow Copy	Click to immediately create a new shadow copy on the selected volume.
View Shadow Copies	Click to view a list of shadow copies on the selected volume.
Set Schedule	Click to set the time and frequency of shadow copies.
Properties...	Click to view the shadow copy properties of the selected volume, including location and size of the cache file.
Manage Shares	Click to go to the Shared Folders screen.

The Shadow Copy Cache File

The default shadow copy settings allocate 10% of the source volume being copied (with a minimum of 100 MB), and store the shadow copies on the same volume as the original volume. See Figure 43. The cache file is located in a hidden protected directory entitled "System Volume Information" off of the root of each volume for which Shadow Copy is enabled.

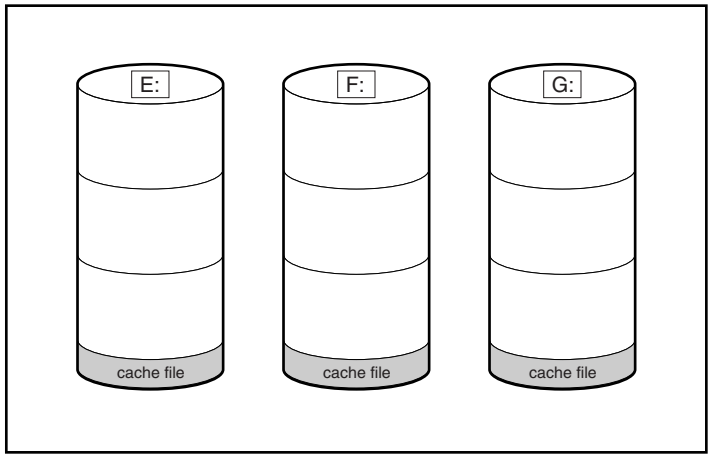


Figure 43: Shadow copies stored on source volume

As mentioned previously, the cache file location can be altered to reside on a dedicated volume separate from the volumes containing files shares. See Figure 44.

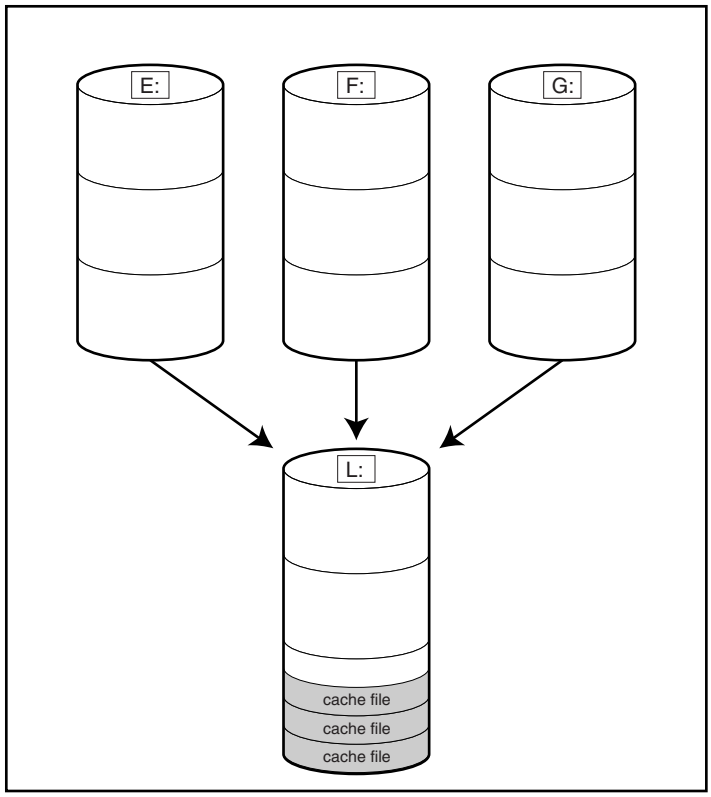


Figure 44: Shadow copies stored on separate volume

The main advantage to storing shadow copies on a separate volume is ease of management and performance. Shadow copies on a source volume must be continually monitored and can consume space designated for file sharing. Setting the limit too high takes up valuable storage space. Setting the limit too low can cause shadow copies to be purged too soon, or not created at all. By storing shadow copies on a separate volume space for Shadow Copies may be manage separately, limits can generally be set higher, or set to No Limit. See the properties tab of the shadow copy page for a volume to alter the cache file location, covered later in this chapter.

Caution: If the data on the separate volume L: is lost, the shadow copies cannot be recovered.

Enabling and Creating Shadow Copies

Enabling the Shadow Copies service for a volume or creating a shadow copy can be done directly from the Manage Shadow Copies page.

Enabling shadow copies on a volume automatically results in several actions:

- Creates a shadow copy of the selected volume
- Sets the maximum storage space for the shadow copies
- Schedules shadow copies to be made at 7 A.M. and 12 noon on weekdays.

Note: Creating a shadow copy only makes one copy of the volume; it does not create a schedule.

To enable shadow copies on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click the **Shadow Copies** tab.
3. On the Manage Shadow Copies page, select one or more volumes to enable the Shadow Copies service on.

Note: After the first shadow copy is created, it cannot be relocated. Relocate the cache file by altering the cache file location under Properties prior to enabling shadow copy. See "Viewing Shadow Copy Properties" in this chapter.

4. Click **Enable**.

To create a shadow copy on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click the **Shadow Copies** tab.
3. On the Manage Shadow Copies page, select one or more volumes to create the shadow copies on.
4. Click **New Shadow Copy**.

Viewing a List of Shadow Copies

To view a list of shadow copies on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click the **Shadow Copies** tab.
3. On the Manage Shadow Copies page, select the volume to view.
4. On the Tasks list, click **View Shadow Copies**.

   All shadow copies are listed, sorted by the date and time they were created.

Note: It is also possible to create new shadow copies or delete shadow copies from this page.

Set Schedules

Shadow Copy schedules control how frequently shadow copies of a volume are made. There are a number of factors that can help determine the most effective shadow copy schedule for an organization. These include the work habits and locations of the users. For example, if users do not all live in the same time zone, or they work on different schedules, it is possible to adjust the daily shadow-copy schedule to allow for these differences.

It is recommended that shadow copies be scheduled not more frequently than once per hour.

Scheduling Shadow Copies

When the Shadow Copies service is enabled on a volume, it automatically schedules shadow copies to be made each weekday at 7 A.M. and 12 noon.

To add or change a shadow copy schedule for a volume:

1. On the primary navigation bar, click **Disks**.
2. Click **Shadow Copies**.
3. Select the volume.
4. In the Tasks list, click **Set Schedule**.
5. On the Shadow Copy Schedules page, click **New**.
6. Select a frequency: Once, Daily, Weekly, or Monthly.
7. Use the remaining controls to specify the recurrence pattern and the starting date and time. The available controls change according to the frequency selected.
8. Click **OK**.

Deleting a Shadow Copy Schedule

To delete a shadow copy schedule on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click the **Shadow Copies** tab.
3. Select the volume on which to delete a shadow copy schedule.
4. In the Tasks list, click **Set Schedule**.
5. On the Manage Shadow Copy Schedules screen, select the schedule to be deleted, and click **Delete**.
6. Click **OK** to confirm the deletion or **Cancel** to retain the copy.

Note: When deleting a shadow copy schedule, that action has no effect on existing shadow copies. To remove schedules and all shadow copies in one action, from the Manage Shadow Copies page, choose Disable from the Tasks list.

Viewing Shadow Copy Properties

To view shadow copy properties on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click the **Shadow Copies** tab.

3. On the Manage Shadow Copies page, select the volume on which to view shadow copy properties.
4. On the Tasks list, click **Properties**.

   The Shadow Copy Properties screen, as shown in Figure 45, lists the number of copies, the date and time the most recent shadow copy was made, and the maximum size setting.

   Change the maximum size limit for all shadow copies, or choose **No limit**.

   For volumes where shadow copies do not exist currently, it is possible to change the location of the cache file. See "The Shadow Copy Cache File" earlier in this chapter. The list of available disks and the space available on each is presented at the bottom of the page. Managing the cache files on a separate disk is recommended.

Note: If shadow copies have already been enabled, the cache file location is grayed out. To change this location after shadow copies have been enabled, all shadow copies must be deleted and cannot be recovered. Remember enabling Shadow Copies creates a Shadow Copy by default.

5. Click **OK** to save changes, or click **Cancel** to discard changes.

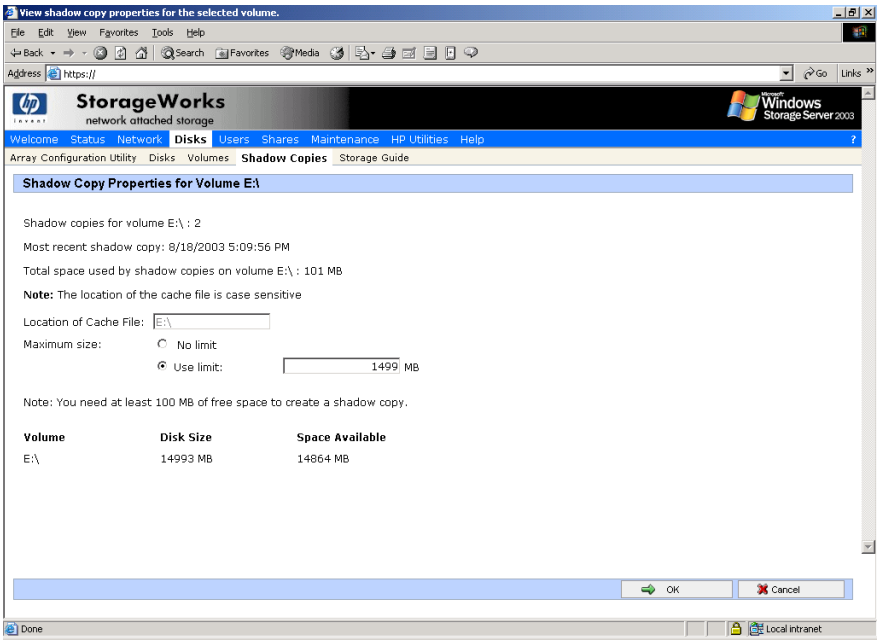

View shadow copy properties for the selected volume.
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Array Configuration Utility Disks Volumes Shadow Copies Storage Guide
Shadow Copy Properties for Volume E:\
Shadow copies for volume E:\ : 2
Most recent shadow copy: 8/18/2003 5:09:56 PM
Total space used by shadow copies on volume E:\ : 101 MB
Note: The location of the cache file is case sensitive
Location of Cache File: E:\
Maximum size:
No limit
Use limit: 1499 MB
Note: You need at least 100 MB of free space to create a shadow copy.
Volume
Disk Size
Space Available
E:\
14993 MB
14864 MB
OK
Cancel
Done
Local intranet

Figure 45: Shadow Copies properties screen

Caution: Use caution when reducing the size limit for all shadow copies. When the size is set to less than the total size currently used for all shadow copies, enough shadow copies are deleted to reduce the total size to the new limit. A shadow copy cannot be recovered after it has been deleted.

Disabling Shadow Copies

When shadow copies are disabled on a volume, all existing shadow copies on the volume are deleted as well as the schedule for making new shadow copies.

To disable shadow copies on a volume:

1. On the primary navigation bar, click **Disks**.
2. Click the **Shadow Copies** tab.
3. On the Manage Shadow Copies page, select one or more volumes on which to disable shadow copies.
4. In the Tasks list, click **Disable**.

   The Disable Shadow Copies page identifies the volume for which shadow copies will be disabled.
5. Click **OK** to delete all existing shadow copies and settings for the volume.

Caution: When the Shadow Copies service is disabled, all shadow copies on the selected volumes are deleted. Once deleted, shadow copies cannot be restored.

Managing Shadow Copies from the NAS Desktop

As an alternative to managing Shadow Copies via the WebUI, the NAS Desktop may be accessed via Remote Desktop.

To access Shadow Copies from the NAS Desktop:

1. From the WebUI select **Remote Desktop** from the Maintenance tab.
2. Click on **My Computer**.
3. Select the volume.
4. Right-click on the volume name and select **Properties**.
5. Click the **Shadow Copies** tab.

The user interface provides the same functionality found in the WebUI but in Win32 form. See Figure 46.

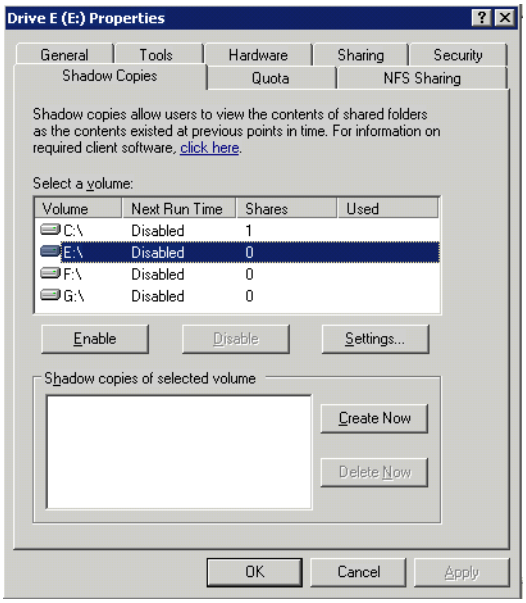


Figure 46: Accessing shadow copies from My Computer

Shadow Copies for Shared Folders

Shadow Copies are accessed over the network by supported clients and protocols. There are two sets of supported protocols, SMB and NFS. All other protocols are not supported; this would include HTTP, FTP, AppleTalk, and NetWare Shares. For SMB support a client side application denoted as Shadow Copies for Shared Folders is required. The client side application is currently only available for Windows XP and Windows 2000 SP3+. The application is included on the HP StorageWorks NAS device from the following directory:

C:\hpnas\Components\ShadowCopyClient\XP and 2000-SP3+

No additional software is required to enable UNIX users to independently retrieve previous versions of files stored on NFS shares.

Note: Shadow Copies for Shared Folders supports retrieval only of shadow copies of network shares. It does not support retrieval of shadow copies of local folders.

Note: Shadow Copies for Shared Folders clients are not available for HTTP, FTP, AppleTalk, or NetWare shares. Consequently, users of these protocols cannot use Shadow Copies for Shared Folders to independently retrieve previous versions of their files. However, administrators can take advantage of Shadow Copies for Shared Folders to restore files on behalf of these users.

SMB Shadow Copies

Windows users can independently access previous versions of files stored on SMB shares via the Shadow Copies for Shared Folders client. After the Shadow Copies for Shared Folders client is installed on the user's computer, the user can access shadow copies for a share by right-clicking on the share to open its Properties dialog, selecting the Previous Versions tab, and then selecting the desired shadow copy. Users can view, copy, and restore all available shadow copies.

Shadow Copies for Shared Folders preserves the permissions set in the access control list (ACL) of the original folders and files. Consequently, users can only access shadow copies for shares to which they have access. In other words, if a user does not have access to a share, he also does not have access to the share's shadow copies.

The Shadow Copies of Shared Folders client pack installs a **Previous Versions** tab in the **Properties** dialog box of files and folders on network shares.

Users access shadow copies with Windows Explorer by selecting **View**, **Copy**, or **Restore**, from the **Previous Versions** tab. See Figure 47. Both individual files and folders may be restored.

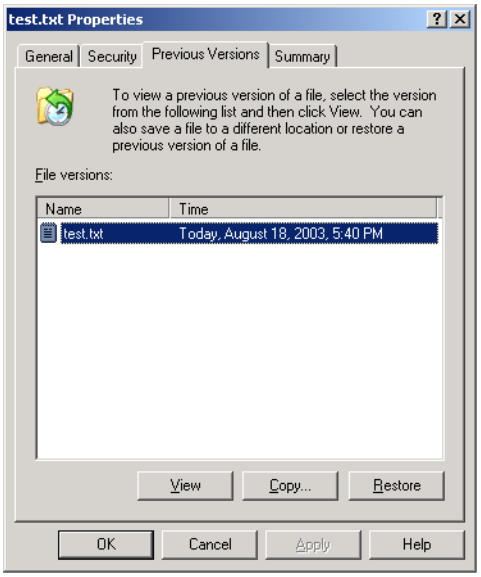


Figure 47: Client GUI

When users view a network folder hosted on the NAS device for which shadow copies are enabled, old versions (prior to the snapshot) of a file or directory are available. Viewing the properties of the file or folder presents users with the folder or file history-a list of read-only, point-in-time copies of the file or folder contents that users can then open and explore like any other file or folder. Users can view files in the folder history, copy files from the folder history, and so on.

NFS Shadow Copies

UNIX users can independently access previous versions of files stored on NFS shares via the NFS client; no additional software is required. Server for NFS exposes each of a share's available shadow copies as a pseudo-subdirectory of the share. Each of these pseudo-subdirectories is displayed in exactly the same way as a regular subdirectory is displayed.

The name of each pseudo-subdirectory reflects the creation time of the shadow copy, using the format.@GMT-YYYY.MM.DD-HH:MM:SS. Note that, to prevent common tools from needlessly enumerating the pseudo-subdirectories, the name of each pseudo-subdirectory begins with the dot character, thus rendering it hidden.

The following example shows an NFS share named “NFSShare” with three shadow copies, taken on April 27, 28, and 29 of 2003 at 4 a.m.

NFSShare

.@GMT-2003.04.27-04:00:00

.@GMT-2003.04.28-04:00:00

.@GMT-2003.04.29-04:00:00

Access to NFS shadow copy pseudo-subdirectories is governed by normal access-control mechanisms using the permissions stored in the file system. Users can access only those shadow copies to which they have read access at the time the shadow copy is taken. To prevent users from modifying shadow copies, all pseudo-subdirectories are marked read-only, regardless of the user's ownership or access rights, or the permissions set on the original files.

Server for NFS periodically polls the system for the arrival or removal of shadow copies and updates the root directory view accordingly. Clients then capture the updated view the next time they issue a directory read on the root of the share.

Recovery of Files or Folders

There are three common situations that may require recovery of files or folders:

- Accidental file deletion, the most common situation.
- Accidental file replacement, which may occur if a user selects Save instead of Save As.
- File corruption.

It is possible to recover from all of these scenarios by accessing shadow copies. There are separate steps for accessing a file compared to accessing a folder.

As documented previously, the use of the snapshots are from the network and are based on shares created on the NAS server.

On Windows 2000 SP3 clients, snapshot access is not fully functional at the share point of the network drive. At the sharepoint, a file or folder that is deleted cannot be recovered directly. It is recommended that end user files exist under a folder below the share point to ensure easy recovery of their contents and that the file folders not be removed. Therefore recovery is broken out into two categories, sharepoint and non-sharepoint. This behavior is not evident in Windows XP or Windows 2003 clients.

Recovering a Deleted File or Folder (non-sharepoint or Windows XP/Windows 2003)

To recover a deleted file or folder within a folder:

1. Navigate to the folder where the deleted file was stored.
2. Position the cursor over a blank space in the folder. If the cursor hovers over a file, that file will be selected.
3. Right-click the mouse and select **Properties** from the bottom of the menu. Select the **Previous Versions** tab.
4. Select the version of the folder that contains the file before it was deleted, and then click **View**.
5. View the folder and select the file or folder to recover. The view may be navigated multiple folders deep.
6. Select restore to restore the file or folder to its original location. Selecting copy will allow the placement of the file or folder to a new location.

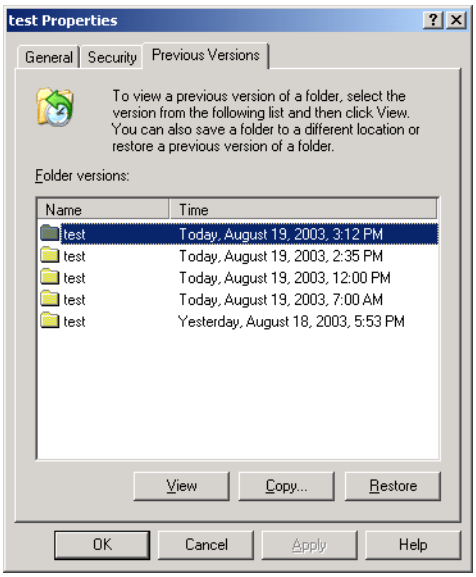


Figure 48: Recovering a deleted file or folder (non-sharepoint)

Recovering a Deleted File or Folder (sharepoint - Windows 2000 SP3 only)

To recover a deleted file or folder at a sharepoint:

1. Navigate to the sharepoint where the deleted file or folder was stored.
2. Recreate the file or folder that was deleted with the exact same name.
3. Right-click the mouse on the newly created file or folder and select **Properties** from the bottom of the menu. Select the **Previous Versions** tab.
4. Select the version of the folder that contains the file before it was deleted, and then click **View**.
5. View the folder and select the file or folder to recover. The view may be navigated multiple folders deep.
6. Select restore to restore the file or folder to its original location. Selecting copy will allow the placement of the file folder to a new location.

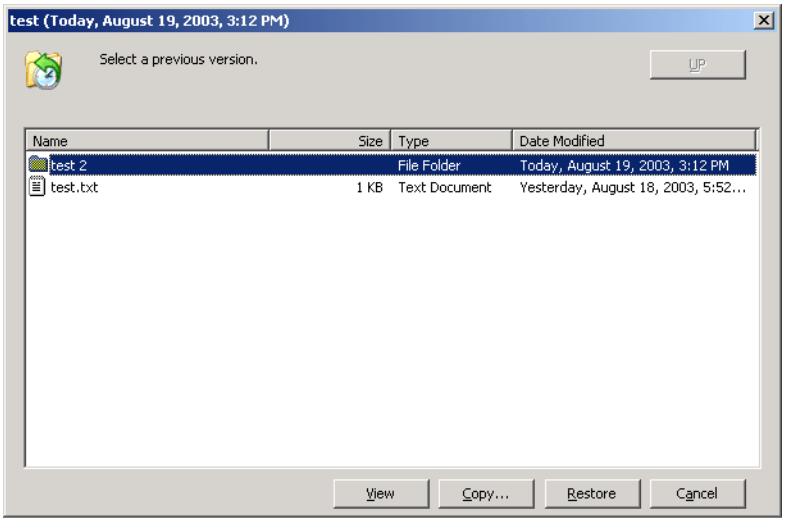


Figure 49: Recovering a deleted file or folder (sharepoint)

In some situations, the name of the folder or file can not be recalled. In this case, if the user has access to the root or the administrator is available, the following procedure may be followed:

1. Select **Start** > **Run** and Type in: *name_of_server*. A window will open with all of the shares listed on the server.
2. Select the share that the file or folder is missing from.
3. Right-click the mouse on the appropriate share and select **Properties** from the bottom of the menu. Select the **Previous Versions** tab.
4. Select the version of the folder that contains the file or folder before it was deleted, and then click **View**.
5. View the folder and select the file or folder to recover. The view may be navigated multiple folders deep.
6. Select restore to restore the file or folder to its original location. Selecting copy will allow the placement of the file or folder to a new location.

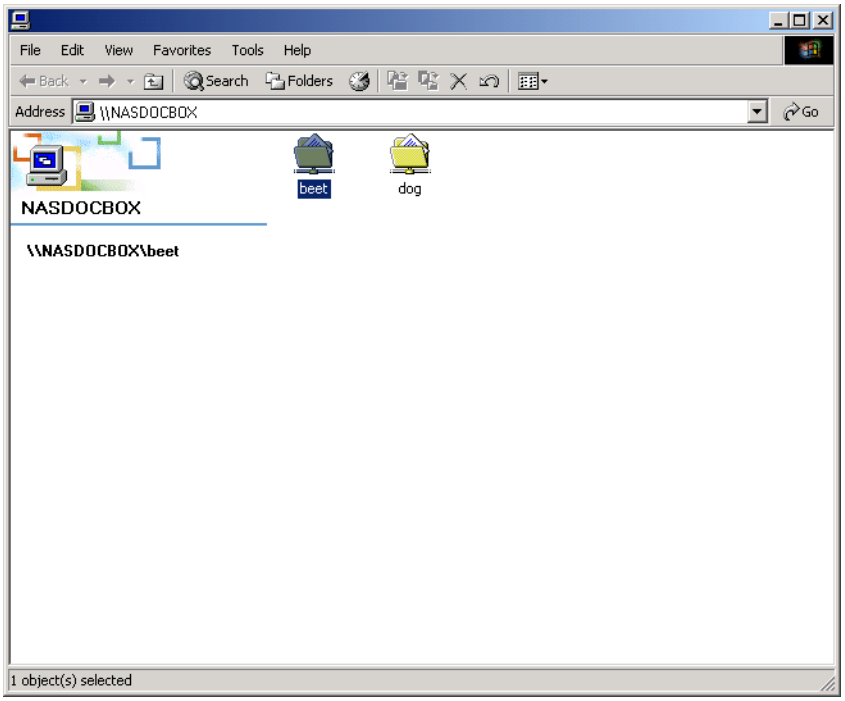


Figure 50: Viewing root shares

Recovering an Overwritten or Corrupted File

Recovering an overwritten or corrupted file is easier than recovering a deleted file because the file itself can be right-clicked instead of the folder. To recover an overwritten or corrupted file use the following procedure:

1. Right-click the overwritten or corrupted file and click **Properties**.
2. Select **Previous Versions**.
3. To view the old version, click **View**. To copy the old version to another location, click **Copy...** to replace the current version with the older version, click **Restore**.

Recovering a Folder

To recover a folder use the following procedure:

1. Position the cursor so that it is over a blank space in the folder that will be recovered. If the cursor hovers over a file, that file will be selected.
2. Right-click the mouse, select **Properties** from the bottom of the menu, then click the **Previous Versions** tab.
3. Choose either **Copy** or **Restore**.
4. Choosing **Restore** enables the user to recover everything in that folder as well as all subfolders. Selecting **Restore** will not delete any files.

Backup and Shadow Copies

As mentioned previously, Shadow Copies are only available on the network via the client application and only at a file or folder level as opposed to the entire volume. Hence the standard backup associated with a volume backup will not work to back up the previous versions of the file system. To answer this particular issue, Shadow Copies are available for back up in two situations. If the backup software in question supports the use of Shadow Copies and can communicate with underlying block device, it is supported and the previous version of the file system will be listed in the backup application as a complete file system snapshot. Lastly, if the built in backup application NTbackup is utilized, the backup software forces a snapshot and then uses the snapshot as the means for backup. The user is unaware of this activity and it is not self evident although it does address the issue of open files.

User and Group Management

6

There are two system environments for users and groups: workgroup and domain. Because users and groups in a domain environment are managed through standard Windows NT or Windows 2000 domain administration methods, this document discusses only local users and groups, which are stored and managed on the NAS device. For information on managing users and groups on a domain, refer to the domain documentation available on the Microsoft website.

Domain Compared to Workgroup Environments

NAS 2000s devices can be deployed in workgroup or domain environments. When in a domain environment, the server is a member of the domain. The domain controller is a repository of accounts and account access for the NAS 2000s. Client machines are also members of the domain, and users log on to the domain through their Windows clients. The domain controller also administers user accounts and appropriate access levels to resources that are a part of the domain.

In a CIFS/SMB environment, when mapping a network drive or a client machine, a user sends a logon credential to the server. This credential includes the username, password, and if appropriate, domain information. Using the credential, the server authenticates and provides the corresponding access to the user.

When a NAS 2000s is deployed into a workgroup environment, all user and group account access permissions to file resources are stored locally on the server.

By contrast, when a NAS 2000s is deployed into a domain environment it uses the account database from the domain controller, with user and group accounts stored outside the server. The server integrates with the domain controller infrastructure.

Note: The NAS 2000s cannot act as a domain controller for other servers on the network. If user and group account information is stored locally, those accounts may be used only to authenticate logons to the NAS 2000s, resulting in a workgroup configuration.

Administering users and groups in a domain environment is similar in a mechanical sense to administering them in a workgroup environment. If using an Active Directory domain controller, the Computer Management tool allows for adding, modifying, and removing users in the same context as in a workgroup environment. The concepts, however, are very different.

Additional information about planning for domain environments can be found at:

http://www.microsoft.com/windows2000/technologies/directory/ad/default.asp

The configuration of the domain controller is reflected on the NAS 2000s because it obtains user account information from the domain controller when deployed in a domain environment. As mentioned previously, the server cannot act as a domain controller itself.

User and Group Name Planning

Effective user and group management is dependent upon how well the user and group names are organized. Administrators typically create a small number of groups on the network and then assign users to the appropriate group or groups. File system and share permissions can then be applied at the group level, rather than at the user level. If the number of groups is small, assigning the appropriate permissions to selected group, or groups, is more efficient than assigning permissions to each user.

Although each organization has specific conventions, following general guidelines makes administration simpler and more efficient. Because CIFS/SMB is dependent on users and groups to grant appropriate access levels to file shares, CIFS/SMB administration benefits from a consistent user and group administration strategy.

Managing User Names

Usernames should reflect a logical relationship between the username and the person who uses the account. It is important that rules are established to ensure that usernames are:

- Systematic
- Easy to follow and implement
- Easy to remember

Using a combination of the user's first name, middle initial, and last name results in systematic usernames for every member of a particular organization. Common examples include:

- First initial followed by last name (jdoe for John Doe)
- First initial followed by middle initial and last name (jqpublic for John Q. Public)
- First name followed by last name, separated by a period (john.smith for John Smith)
- Last name followed by first initial (doej for Jane Doe)

Guidelines must be in place for instances when two users have the same initials or name. For example, a number can be added to the end of the username (jdoe1 and jdoe2).

Other conventions can be applied. Just ensure that conventions are both systematic and consistent.

Managing Group Names

Group management follows many of the same principles as user management.

It is recommended that group naming conventions be systematic and easy to understand. Make the group name convey some logical information about the function or purpose of the group. Table 11 provides examples of group names.

Table 11: Group Name Examples

Group Name	Description
Administrators	All designated administrators on the server
Users	All standard server users
Power users	All standard server users requiring advanced access levels

Using tags is a helpful convention that indicates the specific access that a particular user has to a network resource. For example, if there is a data share on the device, the network administrator can create a “Data Users ROnly” group and a “Data Users RWrite” group to contain users that have read only or read write access on the share, respectively.

Workgroup User and Group Management

In a workgroup environment, users and groups are managed through the WebUI of the NAS 2000s. Within the Users option, there are two choices:

- Managing local users
- Managing local groups

User and group administrative tasks include adding, deleting, and modifying user and group information. Managing local users and managing local groups are discussed in the following paragraphs.

Managing Local Users

Managing users includes the following tasks:

- Adding a new user
- Deleting a user
- Setting a user password
- Modifying user properties

In the WebUI, under **Users**, **Local Users** is the **Local Users on Server** dialog box. All workgroup user administration tasks are performed in the **Local Users** dialog box.

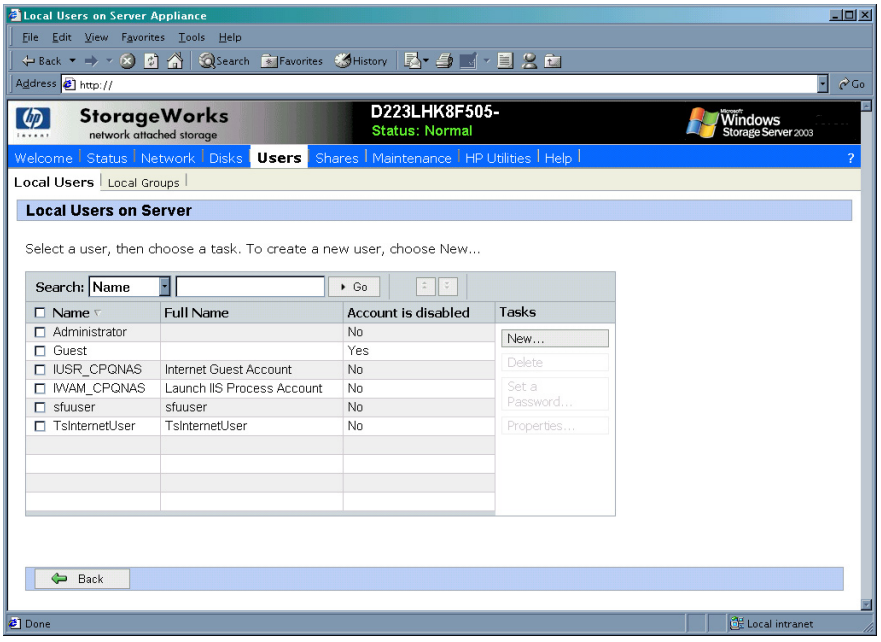


Figure 51: Local Users dialog box

All available options include: **New**, **Delete**, **Set a Password**, and **Properties**. When the **Local Users** dialog box is initially displayed, only the **New** option is available. After an existing user is selected, the additional actions are displayed. Each of these options is discussed in the following paragraphs.

Existing user records can be retrieved in one of two ways:

- By entering the user's User Name or Full Name in the Search fields to retrieve a specific user record. To redisplay the complete user list, space out the Search field.
- By selecting the user from the list of displayed users in the dialog box. The sort order of the display is controlled by clicking the Name field heading. The names are displayed in alphanumeric order or reverse alphanumeric order.

Adding a New User

To add a user:

1. From the **Local Users** dialog box, click **New**. The **Create New User** dialog box is displayed.

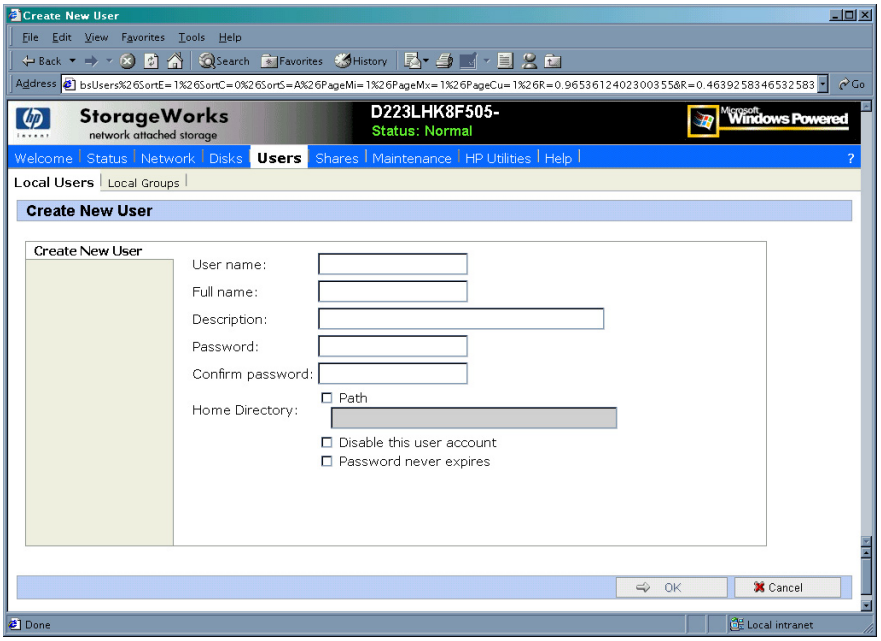


Figure 52: Create New User dialog box

2. Enter the user information and then click **OK**. The user is added and the **Local Users** dialog box is displayed again.

Deleting a User

To delete a user:

1. In the **Local Users** dialog box, select the user to delete, and then click **Delete**.

   The **Delete User** dialog box is displayed, including a warning note about deleting users.

2. To delete the user, click **OK**. The user is deleted and the **Local Users** dialog box is displayed again.

Modifying a User Password

Follow these steps to modify a user password:

1. In the **Local Users** dialog box, select the user whose password needs to be changed. Then, click **Set a Password**.

   The **Set Password** dialog box is displayed.

2. Enter the password and click **OK**. The Local Users dialog box is displayed again.

Modifying User Properties

To modify other user properties:

1. From the **Local Users** dialog box, select the user whose record needs to be modified. Then, click **Properties**.

   The General information page of the **Properties** dialog box is displayed. Figure 53 is an illustration of the **User Properties** dialog box.

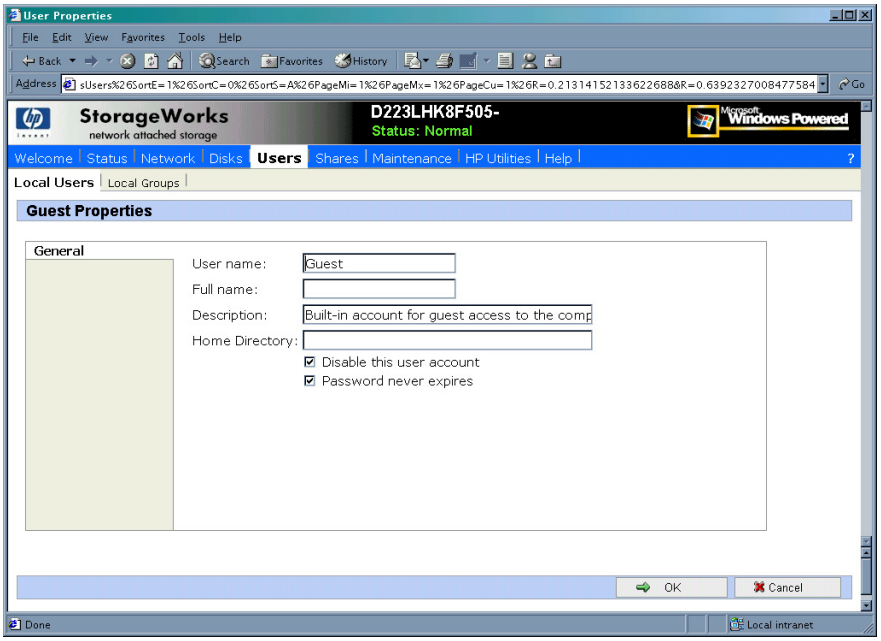


Figure 53: User Properties dialog box

2. The following information can be changed or set:
   - User name
   - Full name
   - Description
   - Home Directory
   - Disable this user account
   - Password expiration
3. After completing the changes, click **OK**. The **Local Users** dialog box is displayed again.

Managing Local Groups

Managing groups includes the following tasks:

- Adding a new group
- Deleting a group
- Modifying group properties, including user memberships

Local groups in a workgroup environment are managed through the Users option in the WebUI.

In the WebUI, under **Users**, **Local Groups** is the **Local Groups on Server** dialog box. All workgroup group administration tasks are performed in the **Local Groups on Server Appliance** dialog box.

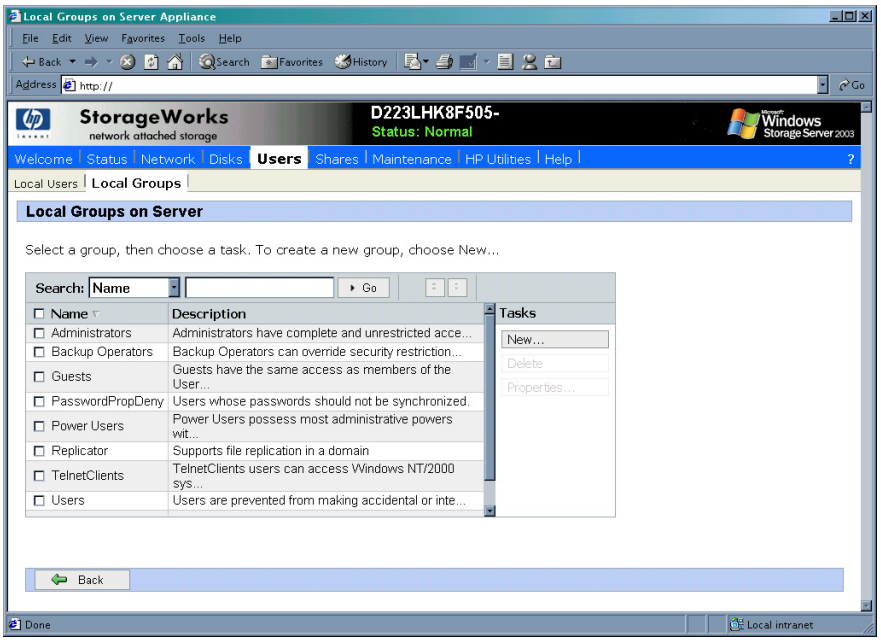


Figure 54: Local Groups dialog box

Adding a New Group

To add a group:

1. In the **Local Groups** dialog box, click **New**.

   The **Create New Group** dialog box is displayed.

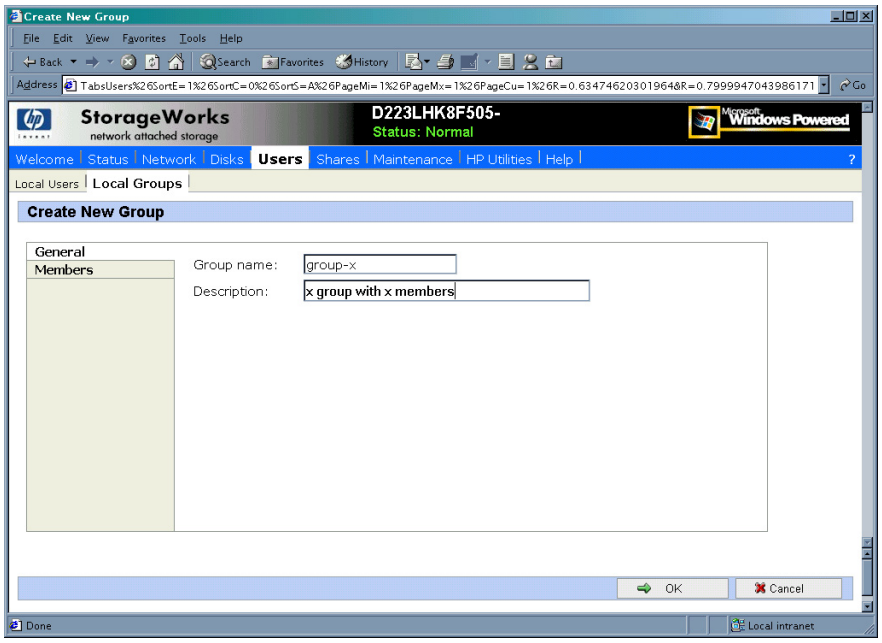


Figure 55: Create New Group dialog box, General tab

2. Enter the group name and description.
3. To indicate the user members of this group, click **Members**. See "Modifying Group Properties" for procedural instructions on entering group members.
4. After all group information is entered, click **OK**. The group is added, and the **Local Groups** dialog box is displayed again.

Deleting a Group

To delete a group:

1. From the **Local Groups** dialog box, select the group to delete, and then click **Delete**.
2. The **Delete Group** dialog box is displayed. Verify that this is the intended group and then click **OK**. The **Local Groups** dialog box is displayed again.

Modifying Group Properties

To modify other group properties:

1. From the **Local Groups** dialog box, select the desired group and then click **Properties**. The **Properties** dialog box is displayed.

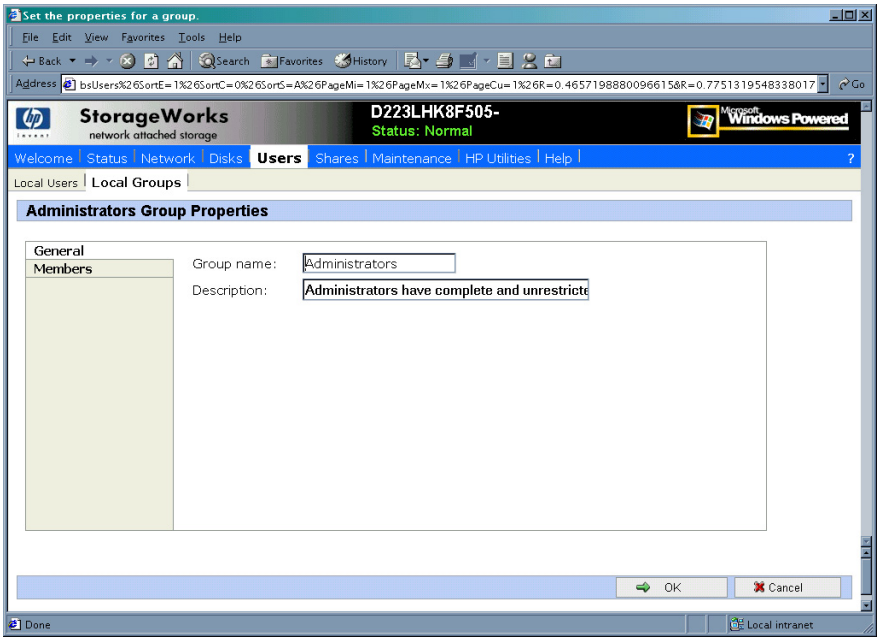


Figure 56: Group Properties dialog box, General tab

Within the Properties dialog box are two tabs:

- General tab
- Members tab

Each of these tabs is discussed in the following paragraphs.

2. Enter the desired changes in each of the tabs. Then, click **OK**. The **Local Groups** dialog box is displayed again.

General Tab

Within the General tab, basic group information can be changed, including:

- Group name
- Description

Members Tab

To indicate or change the members of a group, click the **Members** tab. Within this dialog box, users are added and removed from a group.

Two boxes are displayed: **Members** and **Add user or group**. Current members of that group are listed in the **Members** box. All users are listed in the **Add user or group** box.

- To add an existing local user to a group:
  1. Select the desired user from the **Add user or group** box
  2. Click the **Add** button.
  3. Click **OK** to save the changes.
- To remove an existing local user from a group:
  1. Select the desired user from the **Members** box.
  2. Click **Remove**.
  3. Click **OK** to save the changes.
- To add user or group from a domain to this group, the scroll bar at the right of the screen may need to be used to scroll up the screen display:
  1. Enter the user or group name to include in the indicated format (domain/username).
  2. Select **Add**.
  3. Enter a domain/username and password.
  4. Click **OK** to complete adding the domain user or group.

Note: To add domain users and groups to a local group, the NAS device must be a member of the domain.

Figure 57 is an example of the **Members** tab.

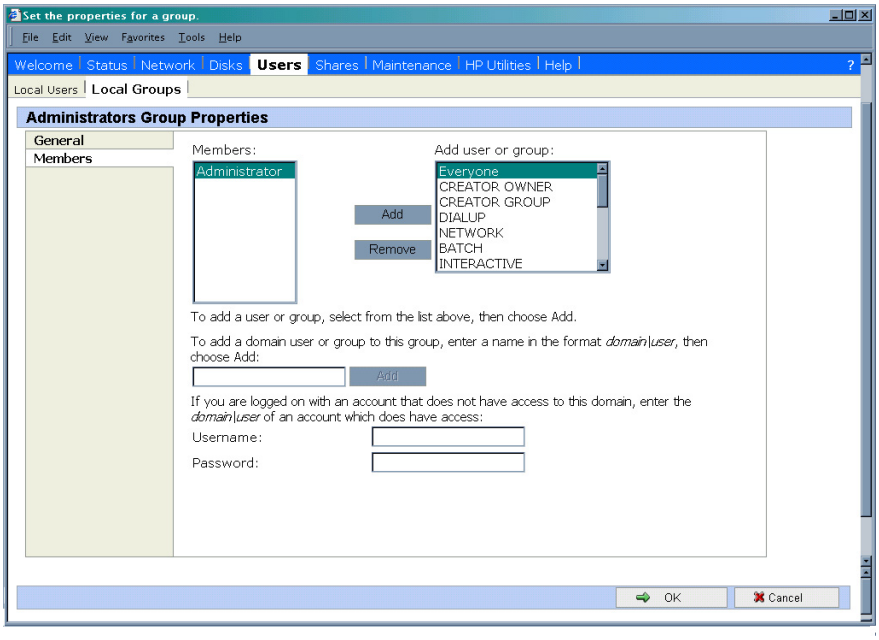

Set the properties for a group.
File Edit View Favorites Tools Help
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Local Users Local Groups
Administrators Group Properties
General
Members
Members:
Administrator
Add user or group:
Everyone
CREATOR OWNER
CREATOR GROUP
DIALUP
NETWORK
BATCH
INTERACTIVE
Add
Remove
To add a user or group, select from the list above, then choose Add.
To add a domain user or group to this group, enter a name in the format domain\user, then choose Add:
Add
If you are logged on with an account that does not have access to this domain, enter the domain\user of an account which does have access:
Username:
Password:
OK
Cancel

Figure 57: Group Properties dialog box, Members tab

Folder, Printer, and Share Management

7

The HP StorageWorks NAS 2000s supports several file sharing protocols, including DFS, NFS, FTP, HTTP, and Microsoft SMB. This chapter discusses overview information as well as procedural instructions for the setup and management of the file shares for the supported protocols. In addition, discussions on security at the file level and at the share level are included in this chapter. As a new feature to the NAS 2000, printer services for network printers are now supported on the platform.

Abbreviated information on creating NFS file shares is included in this chapter; for detailed information on setting up and managing NFS file shares, see the "UNIX File System Management" chapter.

NCP shares must be set up and managed through the NAS Management Console user interface. For information on managing NCP file shares, see the "NetWare File System Management" chapter.

More information about Windows file system security is available on the Microsoft website:

www.microsoft.com/

All procedures in this chapter are documented using the WebUI. In addition to this guide, you may use the WebUI online help.

Folder Management

Volumes and folders on any system are used to organize data. Regardless of system size, systematic structuring and naming conventions of volumes and folders eases the administrative burden. Moving from volumes to folders to shares increases the level of granularity of the types of data stored in the unit and the level of security access allowed.

Although a variety of methods can be used to create and manage file folders on the NAS 2000s, this document discusses using the NAS Web based user interface (WebUI.)

Managing system volumes and file folders includes the following tasks:

- Navigating to a specific volume or folder
- Creating a new folder
- Deleting a folder
- Modifying folder properties
- Creating a new share for a volume or folder
- Managing shares for a volume or folder
- Managing file level permissions

Navigating to a Specific Volume or Folder

When you work with volumes and folders, the first task is to gain access to the desired volume or folder.

The steps are the same, whether navigating to a volume or a folder:

1. To navigate to a specific volume or folder, from the WebUI, select **Shares** and then **Folders**. Initially, the **Volumes** dialog box is displayed.

   This initial dialog box displays all system volumes.

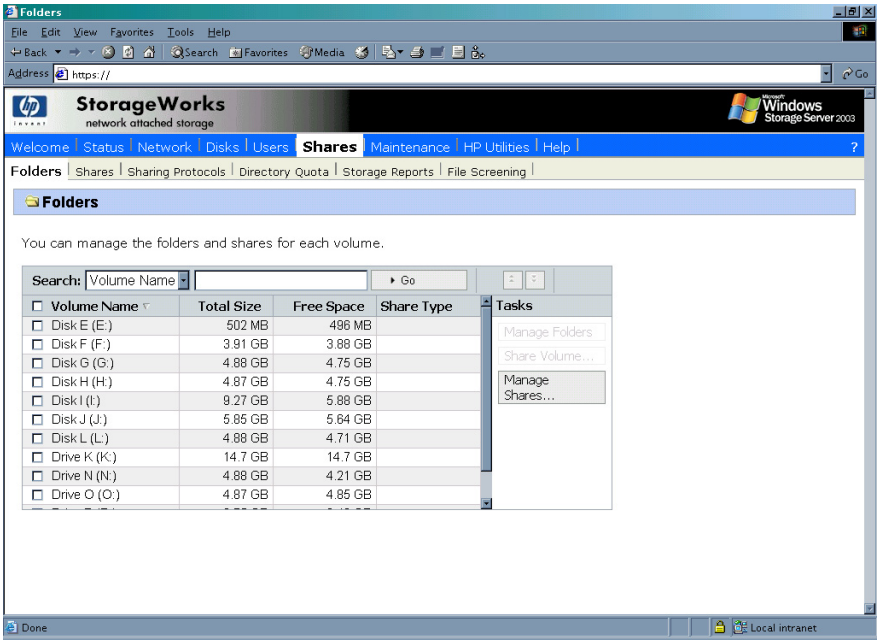

Folders
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
Go
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
Folders
You can manage the folders and shares for each volume.
Search: Volume Name Go
Volume Name | Total Size | Free Space | Share Type
Disk E (E:) 502 MB 496 MB
Disk F (F:) 3.91 GB 3.88 GB
Disk G (G:) 4.88 GB 4.75 GB
Disk H (H:) 4.87 GB 4.75 GB
Disk I (I:) 9.27 GB 5.88 GB
Disk J (J:) 5.85 GB 5.84 GB
Disk L (L:) 4.88 GB 4.71 GB
Drive K (K:) 14.7 GB 14.7 GB
Drive N (N:) 4.88 GB 4.21 GB
Drive O (O:) 4.87 GB 4.85 GB
Tasks
Manage Folders
Share Volume...
Manage Shares...
Done
Local intranet

Figure 58: Volumes dialog box

2. From this dialog box, navigate to a specific folder by selecting the appropriate volume and then clicking **Manage Folders**. The **Folders** dialog box is displayed, with a list of all of the folders within that volume.
3. To navigate to a subfolder, select the folder in which the subfolder resides, and then click **Open**. Repeat this searching and opening process until the desired folder is opened. See Figure 59 for an example of **Folders** dialog box.

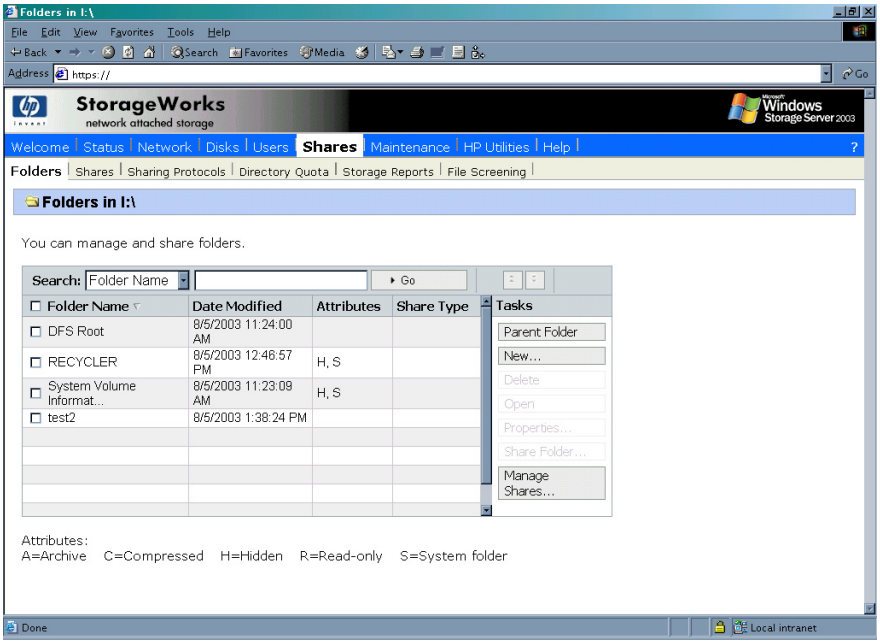


Figure 59: Folders dialog box

After accessing the desired folder, the following actions can be performed:

- Creating a new folder
- Deleting a folder
- Modifying folder properties
- Creating a new share for the volume or folder
- Managing shares for the volume or folder

Creating a New Folder

To create a new folder:

1. From the **Shares** directory, navigate to the **Folders** menu and then select **New**. The **Create New Folder** dialog box is displayed.

   Two tabs are displayed: **General** and **Compress**. Use these two tabs to enter the parameters for the new folder.

2. In the General tab, enter a name for the folder and specify the folder attributes.

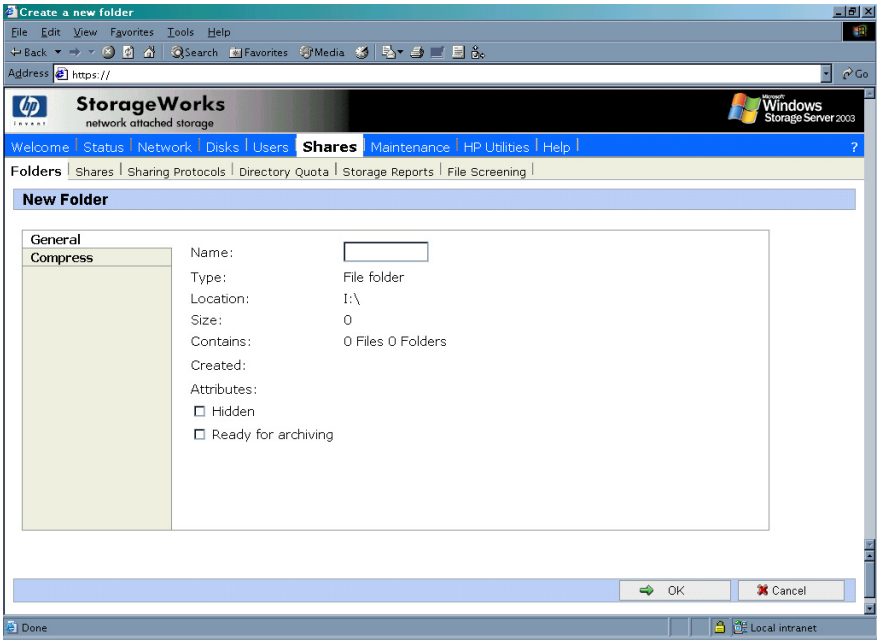


Figure 60: Create a New Folder dialog box, General tab

3. In the **Compress** tab, indicate whether and how this folder and its contents are to be compressed.
4. After all information for the new folder is entered, click **OK**.

Deleting a Folder

To delete a folder:

1. From the **Shares** directory, navigate to the folder to delete. Select the folder and then click **Delete**. The **Delete Folder** dialog box is displayed.

   Summary information about the deletion is displayed.

Note: View the summary information to confirm that this is the intended share.

---

2. Verify that the displayed folder is the folder to delete and then click **OK**.

   The folder and all of its subfolders are deleted and the main dialog box is displayed again.

Modifying Folder Properties

To modify folder properties:

1. From the **Shares** directory, navigate to the folder whose properties need to be edited. Then click **Properties**. The **Properties** dialog box is displayed.

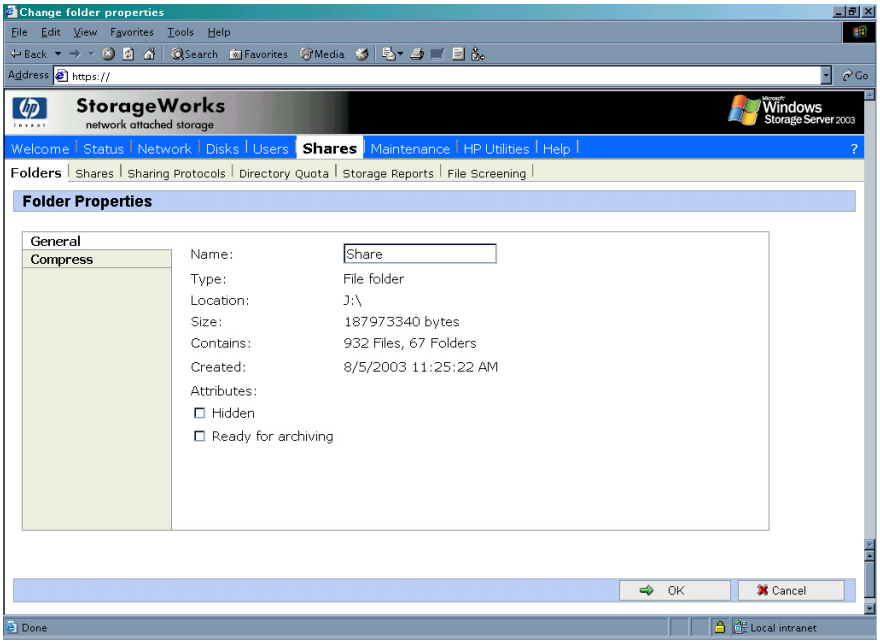


Figure 61: Folder Properties dialog box, General tab

2. In the **General** tab, enter the new information for the folder, which may include:
   - Folder Name
   - Folder Attributes
3. In the **Compress** tab, indicate whether and how this folder and its contents are to be compressed.
4. After all changes have been completed, click **OK**. The **Folders** dialog box is displayed again.

Creating a New Share for a Volume or Folder

Within the WebUI, there are two access points to the same screens used to create file shares:

- A share can be created for a folder while working with that folder in the **Folders** screens.
- A share can be created and, if necessary, new folders can be created, while working with file shares in the **Shares** screens.

This section discusses creating shares from the **Folders** menu, and is an overview of the procedures. Complete details on the process of creating shares are included in the discussion that documents creating shares through the **Shares** menu. See the “Managing Shares” section of this chapter for these details.

To create a new share for a specific volume or folder while in the **Folders** menu:

1. Navigate to the desired volume or folder and click **Manage Shares**.
2. Click **New**. The **Create New Share** dialog box is displayed.

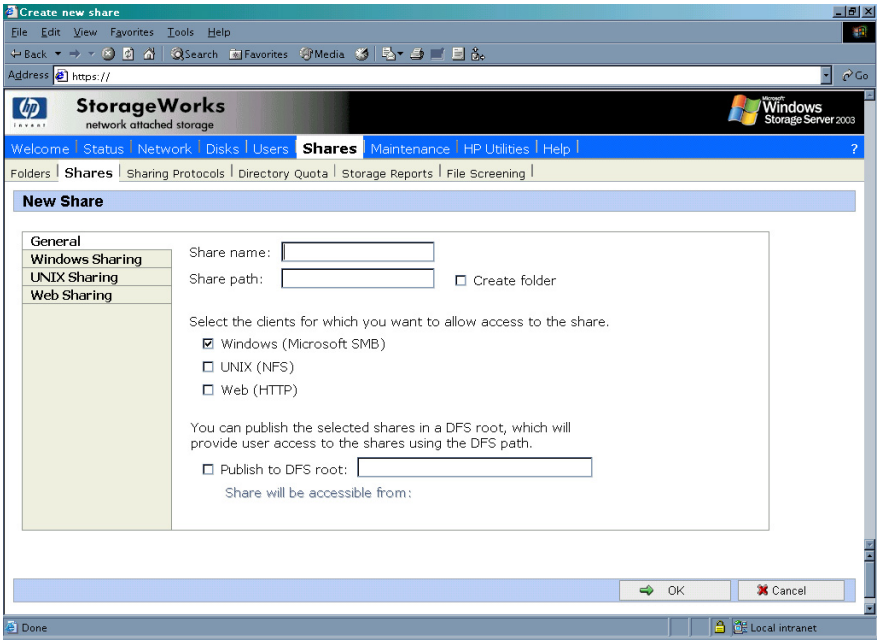

Create new share
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
New Share
General
Windows Sharing
UNIX Sharing
Web Sharing
Share name:
Share path:
Create folder
Select the clients for which you want to allow access to the share.
Windows (Microsoft SMB)
UNIX (NFS)
Web (HTTP)
You can publish the selected shares in a DFS root, which will provide user access to the shares using the DFS path.
Publish to DFS root:
Share will be accessible from:
OK
Cancel
Done
Local intranet

Figure 62: Create New Share dialog box, General tab

3. Enter the information for the share, including the name of the share, the allowed protocols, and corresponding permissions.

Note: The **Share path** is the path of the previously selected volume or folder. This field is automatically completed by the system.

---

4. Select the appropriate tab to enter protocol specific information.

   See the "Managing Shares" section for detailed information about these entries.

5. After entering all share information, click **OK**.

Note: The default permission settings for a new share are read-only.

Managing Shares for a Volume or Folder

Within the WebUI, there are two access points to the same screens used to manage file shares:

- While working with a folder in the **Folders** dialog boxes, the administrator can create, delete, and modify shares for that folder.
- While working with file shares in the **Shares** dialog boxes, the administrator can create, delete, and modify shares (and if necessary, create new folders).

Note: This section discusses managing shares from the **Folders** menu, and is an overview of the procedures. Complete details on the process of managing shares are included in the discussion that documents creating shares through the **Shares** menu. See the "Managing Shares" section later in this chapter for these details.

To create, delete, and manage shares for a particular volume or folder while in the **Folders** menu:

1. From the **Folders** directory, navigate to the target volume or folder and click **Manage Shares**. The **Shared Folders** dialog box is displayed.

   All associated shares for that folder or volume are listed.

2. To create a new share, click **New**. The **Create a New Share** dialog box is displayed.

   Because the screens are the same whether shares are managed through the **Folders** menu or the **Shares** menu, the procedures are only documented once. See "Creating a New Share" in the "Share Management" section for detailed procedural instructions on creating new file shares.

3. To delete a share, select the share to delete and click **Delete**. The **Delete Share** dialog box is displayed.

   Because the screens are the same whether shares are managed through the **Folders** menu or the **Shares** menu, the procedures are only documented once. See "Deleting a New Share" in the "Share Management" section for detailed procedural instructions on deleting file shares

4. To modify share properties, select the share to modify, and click **Properties**. The **Share Properties** dialog box is displayed.

   Because the screens are the same whether shares are managed through the **Folders** menu or the **Shares** menu, the procedures are only documented once. See "Modifying Share Properties" in the "Share Management" section for detailed procedural instructions on modifying shares.

Managing File Level Permissions

The WebUI of the NAS 2000s provides security at the share level and is discussed later in this chapter. Security at the file level is managed using Windows Explorer available from the Desktop of the NAS 2000s. To access the NAS 2000s Desktop from the WebUI, go to the **Maintenance** menu and select **Remote Desktop**.

File level security includes settings for permissions, ownership, and auditing for individual files.

To enter file permissions:

1. Using Windows Explorer, navigate to the folder or file that needs to be changed and then right-click the folder.
2. Select **Properties**, select the **Security** tab, then click **Advanced**. Figure 63 illustrates the properties available on the **Advanced Security Settings** dialog box.

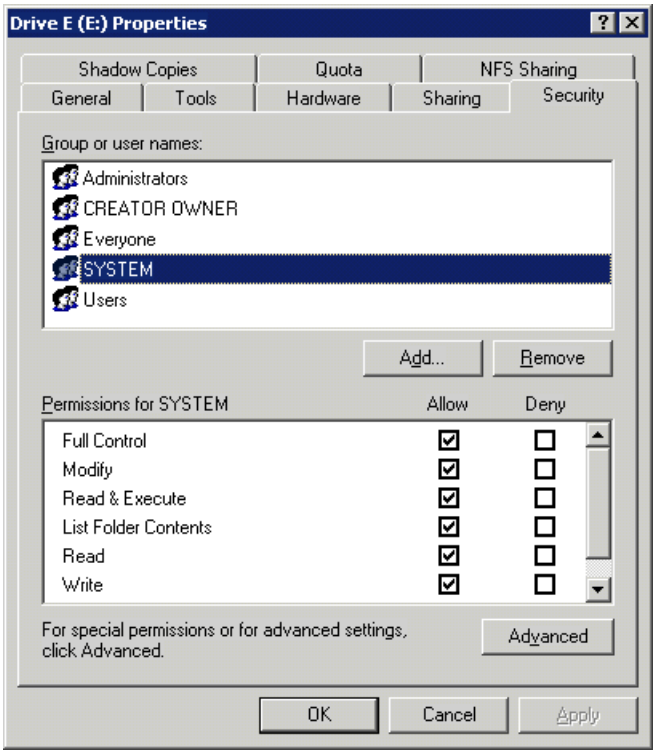


Figure 63: Security Properties dialog box

Several options are available in the **Security** tab dialog box:

- To add users and groups to the permissions list, click **Add**. Then follow the dialog box instructions.
- To remove users and groups from the permissions list, highlight the desired user or group and then click **Remove**.
- The center section of the **Security** tab provides a listing of permission levels. When new users or groups are added to the permissions list, select the appropriate boxes to configure the common file access levels.
- To modify ownership of files or to modify individual file access level permissions, click **Advanced**.

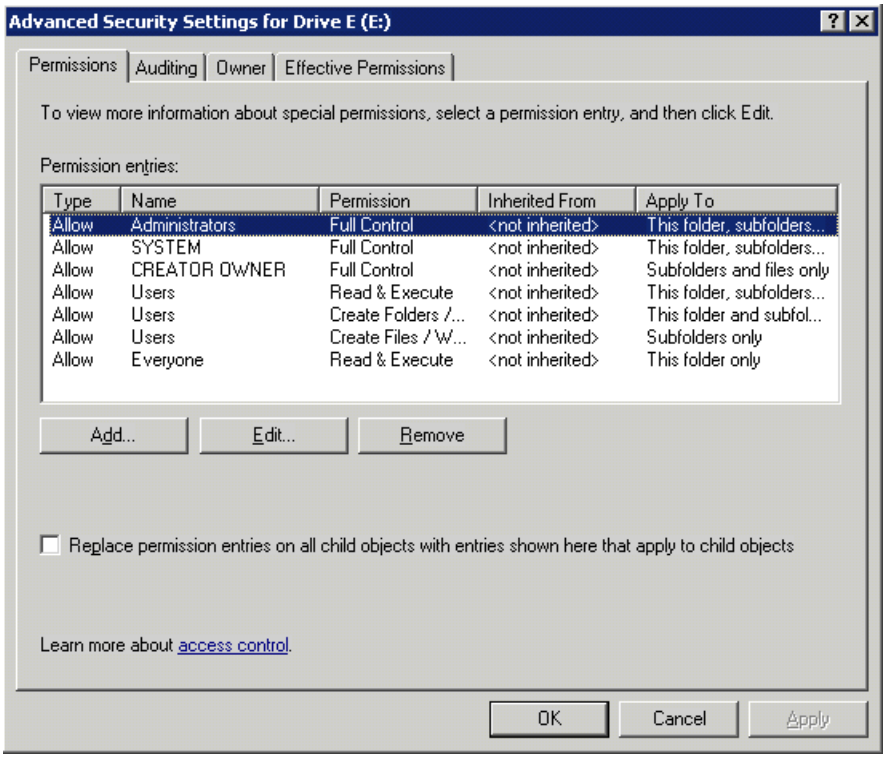


Figure 64: Advanced security settings

To modify specific permissions assigned to a particular user or group for a selected file or folder in the **Advanced** screen:

1. Select the desired user or group.
2. Click **Edit**.
3. Check all the permissions that you want to enable, and clear the permissions that you want to disable. Enable or disable permissions by selecting the **Allow** box to enable permission or the **Deny** box to disable permission. If neither box is selected, permission is automatically disabled. Figure 65 illustrates the **Edit** screen and some of the permissions.

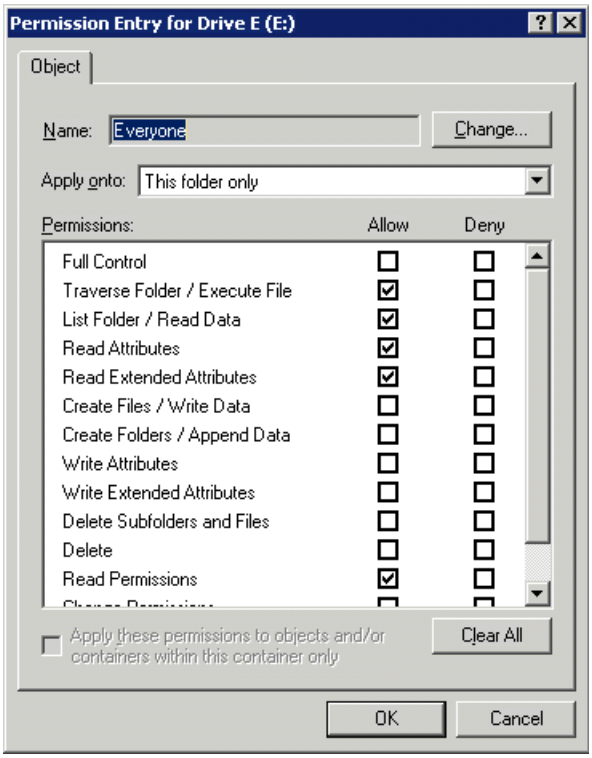


Figure 65: User or Group Permission Entry dialog box

Other functionality available in the **Advanced Security Settings** tab is illustrated in Figure 64 and includes:

- **Add a new user or group**. Click **Add**, and then follow the dialog box instructions.
- **Remove a user or group**. Click **Remove**.
- **Replace permission entries on all child objects with entries shown here that apply to child objects**. This allows all child folders and files to inherit the current folder permissions by default.

Another area of the **Advanced Security Settings** is the **Auditing** tab. Auditing allows you to set rules for the auditing of access, or attempted access, to files or folders. Users or groups can be added, deleted, viewed, or modified through the advanced **Advanced Security Settings Auditing** tab. The **Auditing** tab dialog box is illustrated in Figure 66.

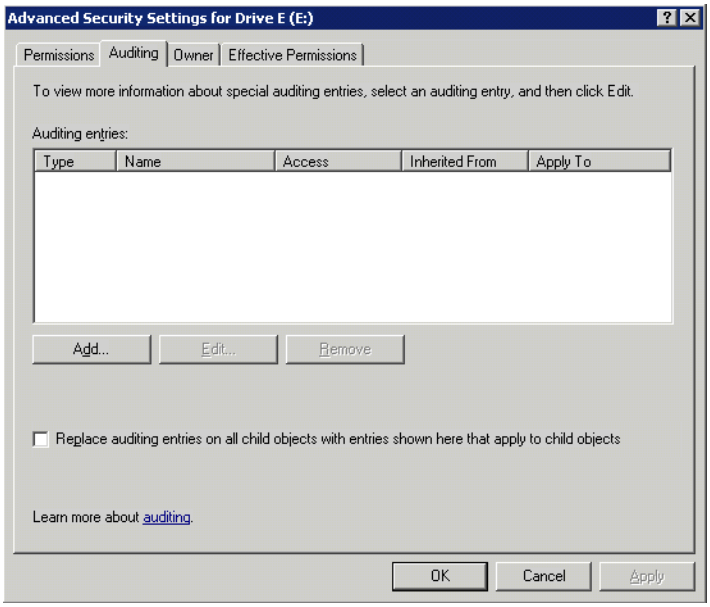


Figure 66: Advanced Security Settings, Auditing tab dialog box

4. Click **Add** to display the Select User or Group dialog box.

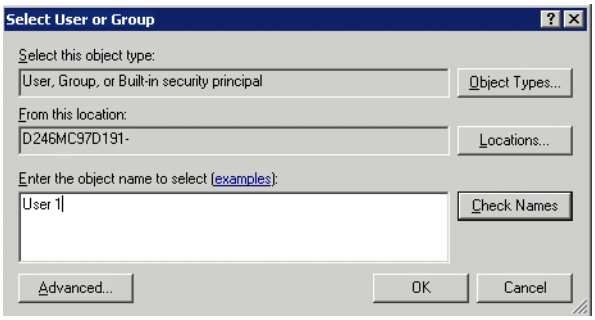


Figure 67: Select User or Group dialog box

Note: Click Advanced to search for users or groups.

5. Select the user or group.

6. Click **OK**. Figure 68 illustrates the **Auditing Entry** screen that is displayed.

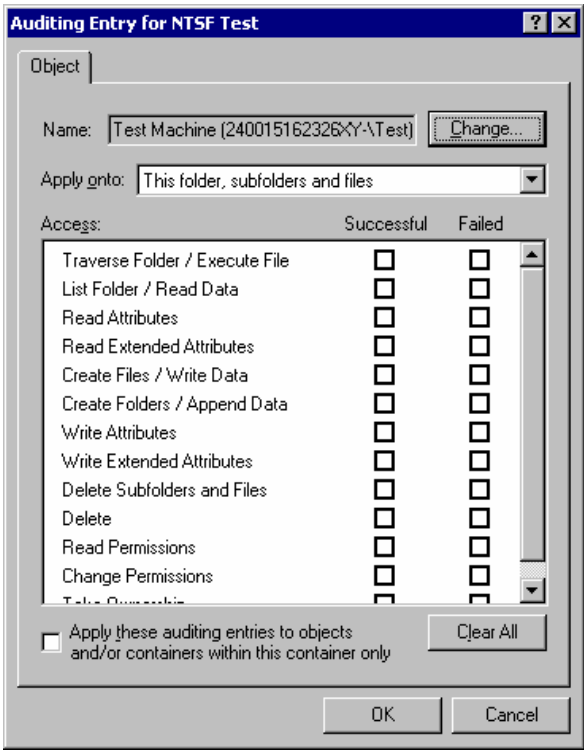


Figure 68: Auditing Entry dialog box for folder name NTSF Test

7. Select the desired **Successful** and **Failed** audits for the user or group as shown in Figure 68.
8. Click **OK**.

Note: Auditing must be enabled to configure this information. Use the local Computer Policy Editor to configure the audit policy on the NAS 2000s.

The **Owner** tab allows for taking ownership of files. Typically, administrators use this area to take ownership of files when the file ACL is incomplete or corrupt. By taking ownership, you gain access to the files and then manually apply the appropriate security configurations. Figure 69 illustrates the **Owner** tab.

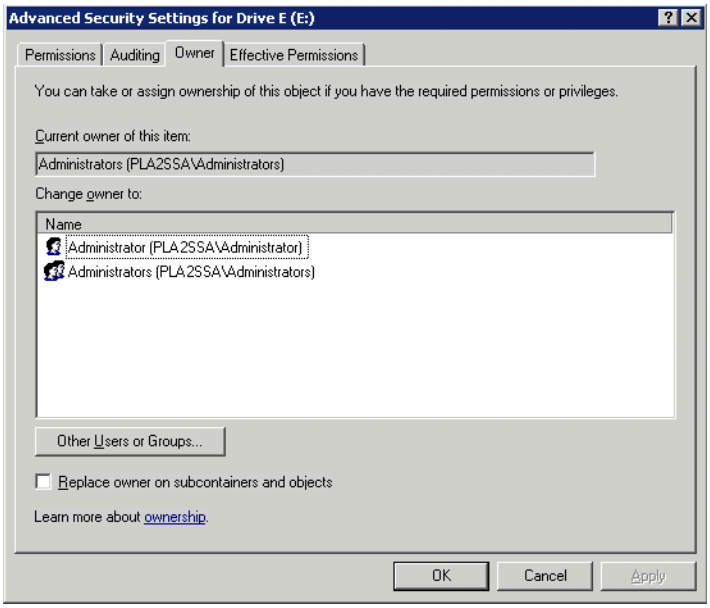


Figure 69: Advanced Security Settings, Owner tab dialog box

The current owner of the file or folder is listed at the top of the screen. To take ownership:

1. Select the appropriate user or group from the **Change owner to** list.
2. If it is also necessary to take ownership of subfolders and files, enable the **Replace owner on subcontainers and objects** box.
3. Click **OK** to execute the commands.

Share Management

There are several ways to set up and manage shares. The WebUI provides screens for setting up and managing shares. Additional methods include using a command line interface, Windows Explorer, or NAS Management Console. This guide demonstrates using the WebUI to set up and manage shares.

As previously mentioned, the file sharing security model of the NAS device is based on the NTFS file-level security model. Share security seamlessly integrates with file security. In addition to discussing share management, this section discusses share security. See "Managing File Level Permissions" earlier in this chapter for information on file security.

Shares management topics include:

- Share Considerations
- Defining Access Control Lists
- Integrating Local File System Security into Windows Domain Environments
- Comparing Administrative and Standard Shares
- Planning for Compatibility between File-Sharing Protocols
- Managing Shares

Share Considerations

Planning the content, size, and distribution of shares on the NAS 2000s can improve performance, manageability, and ease of use.

The content of shares should be carefully chosen to avoid two common pitfalls: either having too many shares of a very specific nature or of having very few shares of a generic nature. For example, shares for general usage are easier to set up in the beginning, but can cause problems later. Frequently, a better approach is to create separate shares with a specific purpose or group of users in mind. However, creating too many shares also has its drawbacks. Take care to avoid creating shares unnecessarily. For example, if it is sufficient to create a single share for user home directories, create a "homes" share rather than creating separate shares for each user.

By keeping the number of shares and other resources low, the performance of the NAS 2000s is optimized. For example, instead of sharing out each individual user's home directory as its own share, share out the top level directory and let the users map personal drives to their own subdirectory.

Defining Access Control Lists

The Access Control List (ACL) contains the information that dictates which users and groups have access to a share, as well as the type of access that is permitted. Each share on an NTFS file system has one ACL with multiple associated user permissions. For example, an ACL can define that User1 has read and write access to a share, User2 has read only access, and User3 has no access to the share. The ACL also includes group access information that applies to every user in a configured group. ACLs are also referred to as permissions.

Integrating Local File System Security into Windows Domain Environments

ACLs include properties specific to users and groups from a particular workgroup server or domain environment. In a multidomain environment, user and group permissions from several domains can apply to files stored on the same device. Users and groups local to the NAS 2000s can be given access permissions to shares managed by the device. The domain name of the NAS 2000s supplies the context in which the user or group is understood. Permission configuration depends on the network and domain infrastructure where the server resides.

File-sharing protocols (except NFS) supply a user and group context for all connections over the network. (NFS supplies a machine based context.) When new files are created by those users or machines, the appropriate ACLs are applied.

Configuration tools provide the ability to share permissions out to clients. These shared permissions are propagated into a file system ACL and when new files are created over the network, the user creating the file becomes the file owner. In cases where a specific subdirectory of a share has different permissions from the share itself, the NTFS permissions on the subdirectory apply instead. This method results in a hierarchical security model where the network protocol permissions and the file permissions work together to provide appropriate security for shares on the device.

Note: Share permissions and file level permissions are implemented separately. It is possible for files on a file system to have different permissions from those applied to a share. When this situation occurs, the file level permissions override the share permissions.

Comparing Administrative (Hidden) and Standard Shares

CIFS supports both administrative shares and standard shares. Administrative shares are shares with a last character of $. Administrative shares are not included in the list of shares when a client browses for available shares on a CIFS server. Standard shares are shares that do not end in a $ character. Standard shares are listed whenever a CIFS client browses for available shares on a CIFS server.

The NAS 2000s supports both administrative and standard CIFS shares. To create an administrative share, end the share name with the $ character when setting up the share. Do not type a $ character at the end of the share name when creating a standard share.

Planning for Compatibility between File Sharing Protocols

When planning for cross-platform share management on the NAS 2000s, it is important to understand the different protocols and their associated constraints. Each additional protocol that is supported adds another level of constraints and complexity.

NFS Compatibility Issues

When planning to manage CIFS and NFS shares, consider two specific requirements.

Note: Further information, including details about the NFS Service and the User Mapping service, is available in the "UNIX File System Management" chapter.

- **NFS service does not support spaces in the names for NFS file share**s.

  NFS translates any spaces in an export into an underscore character. Additional translations can be set up for files. See the "OEM Supplemental Help" chapter of the SFU help, found on the NAS 2000s. This feature is designed to ensure the greatest level of compatibility with NFS clients, because some do not work with NFS exports that contain a space in the export name.

  If you plan to use the same name when sharing a folder through CIFS, and then exporting it through NFS, do not put spaces in the CIFS share name.

- **NFS service does not support exporting a child folder when its parent folder has already been exported**.

  An NFS client can access a child folder by selecting the parent folder and then navigating to the child folder. If strict cross-platform compatibility is an administration goal, CIFS must be managed in the same way. Do not share a folder through CIFS if the parent folder is already shared.

Managing Shares

Shares can be managed through the **Shares** menu option of the WebUI. Tasks include:

- Creating a new share
- Deleting a share
- Modifying share properties

Each of these tasks is discussed in this section.

Creating a New Share

To create a new share:

1. From WebUI main menu, select the **Shares** directory and then select the **Shares** option. The **Shares** dialog box is displayed. From the **Shares** dialog box, click **New**. The **General** tab of the **Create a New Share** dialog box is displayed.

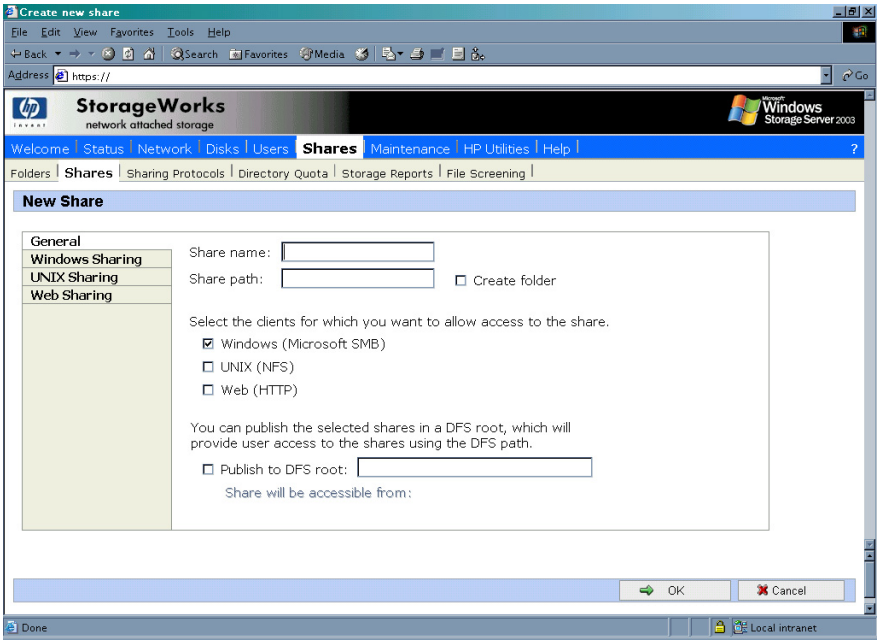

Create new share
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening
New Share
General
Windows Sharing
UNIX Sharing
Web Sharing
Share name:
Share path:
Create folder
Select the clients for which you want to allow access to the share.
Windows (Microsoft SMB)
UNIX (NFS)
Web (HTTP)
You can publish the selected shares in a DFS root, which will provide user access to the shares using the DFS path.
Publish to DFS root:
Share will be accessible from:
OK
Cancel
Done
Local intranet

Figure 70: Create a New Share dialog box, General tab

2. Enter the following information:
   - Share name
   - Share path
   - Client protocol types

   To create a folder for the new share, check the indicated box and the system will create the folder at the same time it creates the share.

   Protocol specific tabs are available to enter sharing and permissions information for each sharing type. See "Modifying Share Properties" for detailed information on these tabs.
3. After entering all share information, click **OK**.

Deleting a Share

Caution: Before deleting a share, warn all users to exit that share and confirm that no one is using the share.

To delete a share:

1. From the **Shares** menu, click **Delete**.
2. Verify that this is the correct share, and then click **OK**.

Modifying Share Properties

To change share settings:

1. From the **Shares** menu, select the share to modify and then click **Properties**. The **General** tab of the **Share Properties** dialog box is displayed.

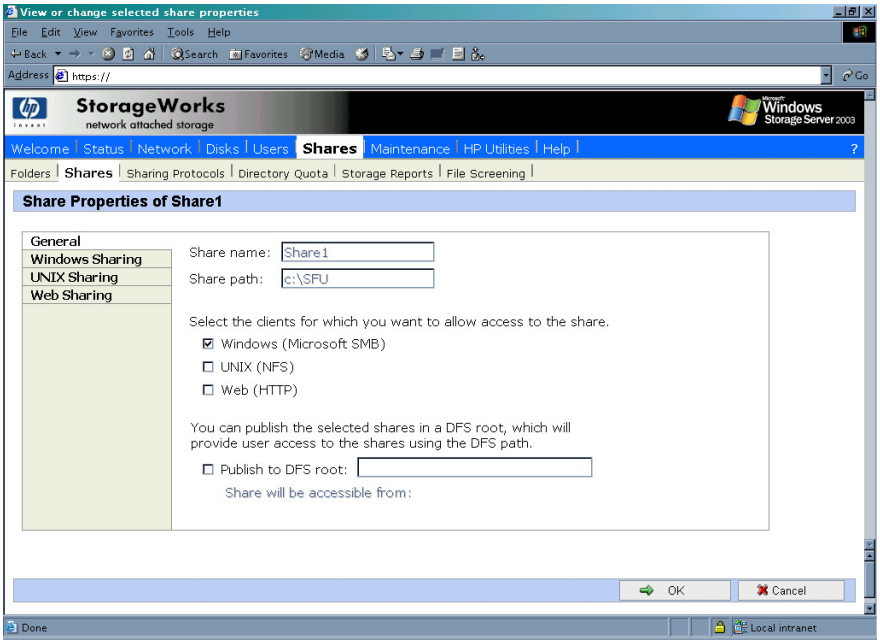

View or change selected share properties
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
Share Properties of Share1
General
Windows Sharing
UNIX Sharing
Web Sharing
Share name: Share1
Share path: c:\SFU
Select the clients for which you want to allow access to the share.
Windows (Microsoft SMB)
UNIX (NFS)
Web (HTTP)
You can publish the selected shares in a DFS root, which will provide user access to the shares using the DFS path.
Publish to DFS root:
Share will be accessible from:
OK
Cancel
Done
Local intranet

Figure 71: Share Properties dialog box, General tab

   The name and path of the selected share is displayed.

2. To enter or change client protocol information, check the appropriate boxes and then click the corresponding tabs.
   - Windows Sharing
   - UNIX Sharing
   - Web Sharing (HTTP)

   Each of these tabs is discussed in the following paragraphs.

3. After all share information has been entered, click **OK**. The **Share** menu is displayed again.

Windows Sharing

From the **Windows Sharing** tab of the **Share Properties** dialog box:

1. Enter a descriptive **Comment**, and the **User limit** (optional).

   See Figure 72 for an example of the **Windows Sharing** tab screen display.

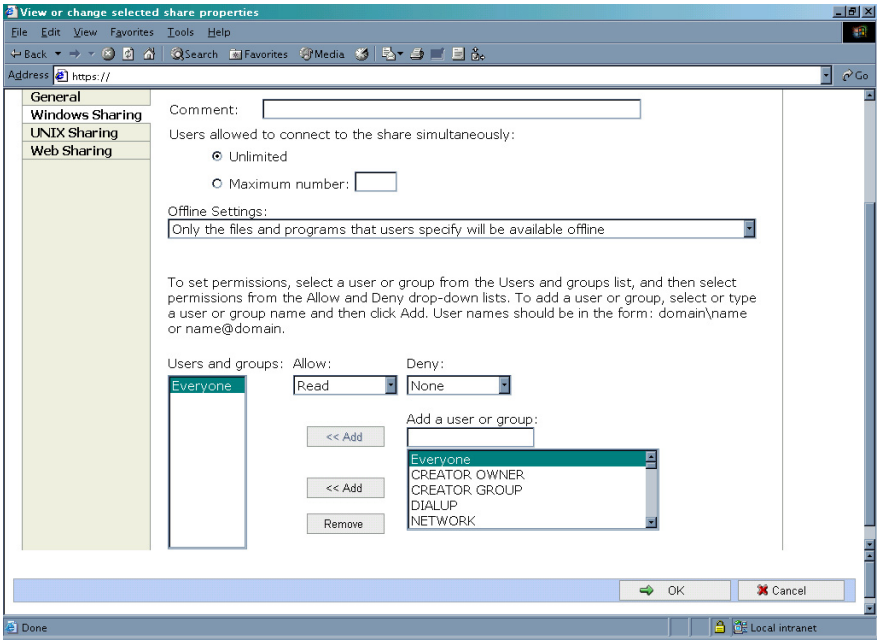


Figure 72: Share Properties dialog box, Windows Sharing tab

2. Select Offline settings.
3. Set the permissions.

   The **Permissions** box lists the currently approved users for this share.

   - To add a new user or group, either select a user or group from the box at the bottom right of the screen or manually enter the user or group name in the Add a user or group box and then click Add. That user or group is added to the Permissions box.
   - To remove access to a currently approved user or group, select the user or group from the Permissions box and then click Remove.
   - To indicate the type of access allowed for each user, select the user and then expand the Allow and Deny drop down boxes. Select the appropriate option.
4. After all Windows Sharing information is entered, either click the next **Sharing** tab or click **OK**.

UNIX Sharing

From the **UNIX Sharing** tab of the **Create a New Share** dialog box:

1. Indicate the machines that will have access to this share.

   Select the machine to include in the **Select a group** box or manually enter the NFS client computer name or IP address. Then click **Add**.

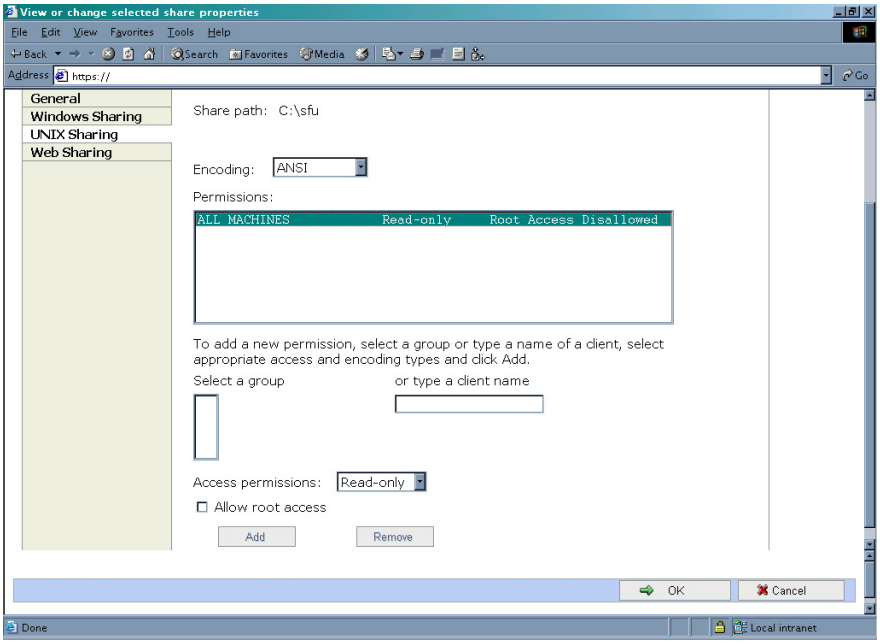


Figure 73: Share Properties dialog box, UNIX Sharing tab

2. Indicate the access permissions.

   Select the machine from the main user display box and then select the appropriate access method from the **Access permissions** drop down box.

   The types of access are:

   - **Read-only**—Use this permission to restrict write access to the share.
   - **Read-write**—Use this permission to allow clients to read or write to the share.
   - **No access**—Use this permission to restrict all access to the share.

3. Select whether or not to allow root access.

   - **Read-only + Root**—Use this permission to restrict write access to the share. Use this permission to assign administrative access to the share. This will allow the client computer to have root access to the NFS share. Map the UNIX root user to the Windows user Administrator. Also, map the group that this UNIX root belongs to, to the Windows group Administrator.
   - **Read-write + Root**—Use this permission to allow clients to read or write to the share. Use this permission to assign administrative access to the share. This will allow the client computer to have root access to the NFS share. Map the UNIX root user to the Windows user Administrator. Also, map the group that this UNIX root belongs to, to the Windows group Administrator.

4. After all UNIX sharing information is entered, click **OK**.

Web Sharing (HTTP)

From the **Web Sharing** tab of the **Create New Share** dialog box:

1. Select the read and write access permissions that are allowed.
2. Click **OK**.

Protocol Parameter Settings

As previously mentioned, the NAS 2000s supports the following protocols:

- DFS
- NFS
- FTP
- HTTP
- Microsoft SMB

This section discusses the parameter settings for each protocol type.

To access and enter protocol parameter settings:

1. From the **Shares** menu, select **Sharing Protocols**. The **File-Sharing Protocols** dialog box is displayed.

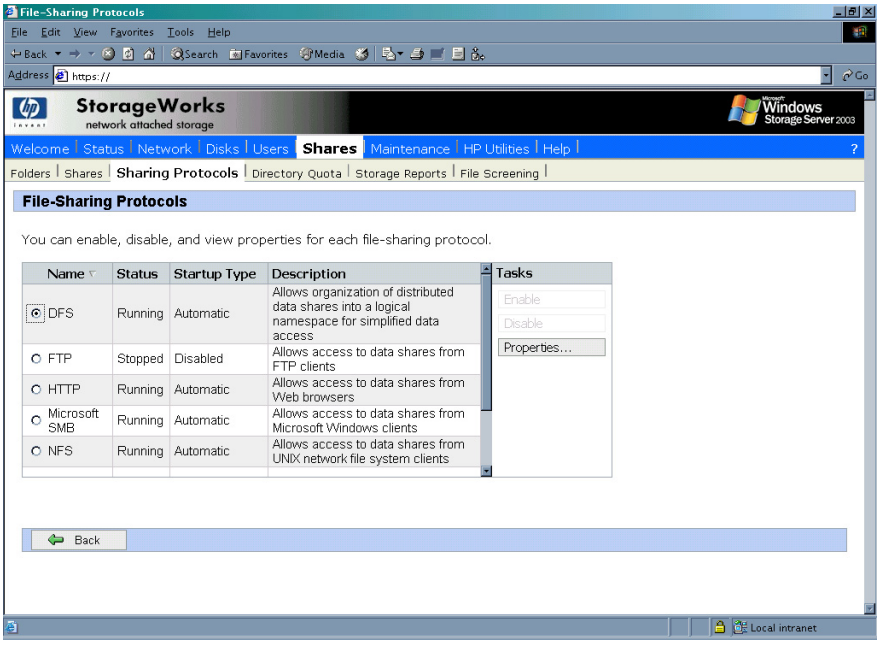

File-Sharing Protocols
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
File-Sharing Protocols
You can enable, disable, and view properties for each file-sharing protocol.
Name | Status | Startup Type | Description
DFS | Running | Automatic | Allows organization of distributed data shares into a logical namespace for simplified data access
FTP | Stopped | Disabled | Allows access to data shares from FTP clients
HTTP | Running | Automatic | Allows access to data shares from Web browsers
Microsoft SMB | Running | Automatic | Allows access to data shares from Microsoft Windows clients
NFS | Running | Automatic | Allows access to data shares from UNIX network file system clients
Tasks
Enable
Disable
Properties...
Back
Local intranet

Figure 74: File-Sharing Protocols dialog box

2. Protocols and their statuses are listed. The following options are available:
   - Enabling a protocol
   - Disabling a protocol
   - Modifying Protocol Settings

Because enabling and disabling a protocol are self explanatory, only modifying protocol specific settings is described in this section.

DFS Protocol Settings

With Distributed File System (DFS) and the Windows SMB protocol, files can be distributed across multiple servers and appear to users as if they reside in one place on the network. A configuration containing multiple shares is known as a virtual namespace.

Using Distributed File System (DFS), system administrators can make it easy for users to access and manage files that are physically distributed across a network. Users do not need to know and specify the actual physical location of files in order to access them.

For example, if documents are scattered across multiple servers in a domain, DFS can make it appear as though the documents all resides on a single server. This eliminates the need for users to go to multiple locations on the network to find the information.

Each DFS namespace requires a root. A DFS root is a starting point of the DFS namespace. The root is often used to refer to the namespace as a whole. A root maps to one or more root targets, each of which corresponds to a shared folder on a server. A root is implemented as a shared folder on the DFS server.

Deploying DFS

A distributed file system can be implemented as a stand-alone root distributed file system or as a domain root distributed file system. The type of a distributed file system determines which client computers can access the distributed file system.

A stand-alone DFS root:

- Does not use Active Directory to manage DFS
- Cannot have more than one root on a server
- Does not support automatic file replication using the File Replication service (FRS)
- Is not fault tolerant and if the root fails the entire namespace will collapse.

A domain DFS root:

- Must be hosted on a domain member server
- Has its DFS namespace automatically published to Active Directory
- Can have more than one root on a server
- Supports automatic file replication through FRS
- Supports fault tolerance through FRS

Two points of management of the DFS namespace are provided with the NAS 2000s. These points of management are the WebUI and the Distributed File System Administration Tool located on the local console of the NAS 2000s under **Start > Programs > Administrative Tool**. See Figure 75. The WebUI is designed to provide the following functions:

- Stand alone root management (Add, Delete)
- Share publishing to stand alone or domain DFS
- Default behavior for DFS share publishing

All other functions must be performed via the DFS Administration Tool. The NAS 2000s administration guide only provides instructions on the Web UI portion of the product. The DFS Administration Tool is complete with online help. In addition, general information on DFS may be found at:

http://www.microsoft.com/windowsserver2003/techinfo/overview/dfs.mspx

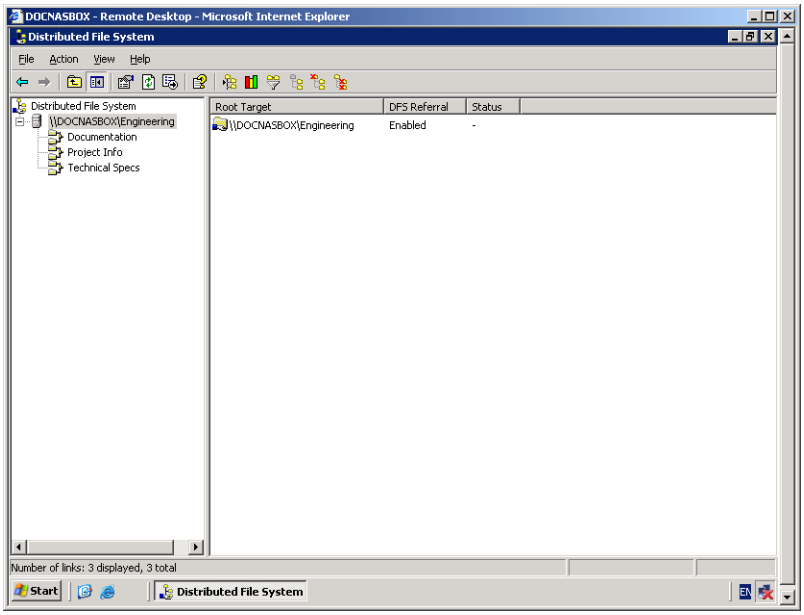


Figure 75: DFS Win32 GUI

DFS Administration Tool

The DFS Administration Tool provides extended functionality not found in the WebUI. These functions include:

- Management of multiple DFS Roots on multiple machines from a single interface
- Domain based DFS management
- Target and Link management
- Status Checks of a DFS managed share link
- Exporting of the DFS names space to a text file

The NAS 2000s administration guide only provides instructions on the WebUI portion of the product. The DFS Administration Tool is complete with online help. In addition, general information on DFS may be found at:

http://www.microsoft.com/windowsserver2003/techinfo/overview/dfs.mspx

Accessing the DFS Namespace from other Computers

In addition to the server-based DFS component of the Windows Server 2003 family, there is a client-based DFS component. The DFS client caches a referral to a DFS root or a DFS link for a specific length of time, defined by the administrator.

The DFS client component runs on a number of different Windows platforms. In the case of older versions of Windows, the client software must be downloaded to run on that version of Windows. Newer versions of Windows have client software built-in.

Non-Windows (such as Linux/UNIX) based clients can not access the DFS namespace as DFS is dependent on a Windows component to function.

Setting DFS Sharing Defaults

The We UI can be used to set the default DFS settings provided when creating a shared folder. When a new shared folder is create, the DFS defaults may be overridden.

To set DFS sharing defaults:

1. On the primary navigation bar, choose **Shares**.
2. Choose **Sharing Protocols**.
3. Select **DFS**, and then choose **Properties**.

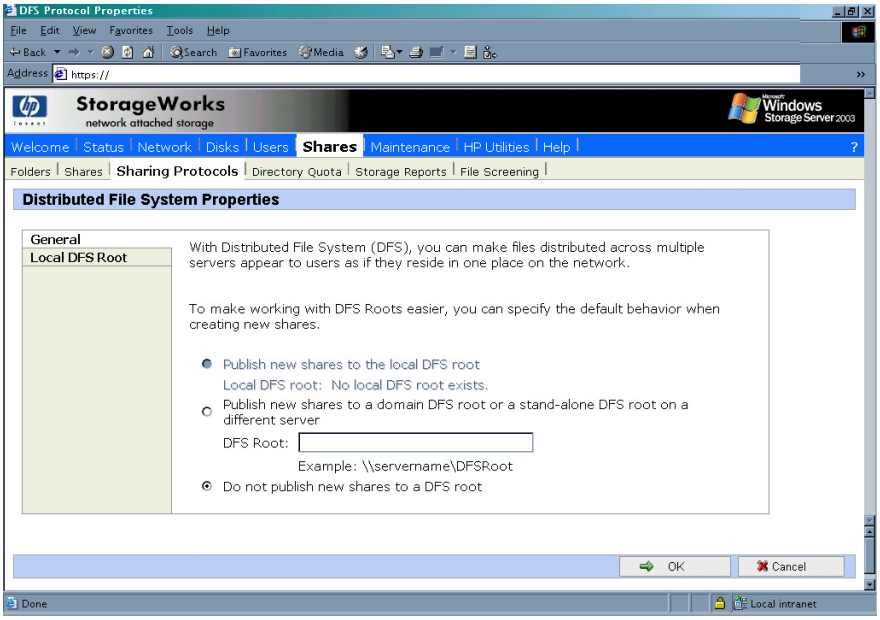

DFS Protocol Properties
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
Distributed File System Properties
General
Local DFS Root
With Distributed File System (DFS), you can make files distributed across multiple servers appear to users as if they reside in one place on the network.
To make working with DFS Roots easier, you can specify the default behavior when creating new shares.
Publish new shares to the local DFS root
Local DFS root: No local DFS root exists.
Publish new shares to a domain DFS root or a stand-alone DFS root on a different server
DFS Root:
Example: \\servername\DFSRoot
Do not publish new shares to a DFS root
OK
Cancel
Done
Local intranet

Figure 76: DFS properties, general tab

4. On the General tab, choose the default settings that are desired when creating a shared directory.
   - To set the default to publish the share to the local DFS root, select **Publish new shares to the local DFS root**.
   - To set the default to publish the share to another DFS root, select **Publish new shares to a domain DFS root or a stand-alone DFS root on a different server**. In the DFS root box, type the path of the default DFS root.
   - To not publish the share to a DFS root, select **Do not publish new shares to a DFS root**.
5. Choose **OK**.

Creating a Local DFS Root

The WebUI can be only be used to create a single, local stand-alone DFS root on the server as mentioned previous. To create a local domain DFS root use the DFS administrative tool. For more information about DFS root types refer to the section above entitled “Deploying DFS”.

To create a local stand-alone DFS root:

1. On the primary navigation bar, choose **Shares**.
2. Choose **Sharing Protocols**.

3. Select **DFS**, and then choose **Properties**.

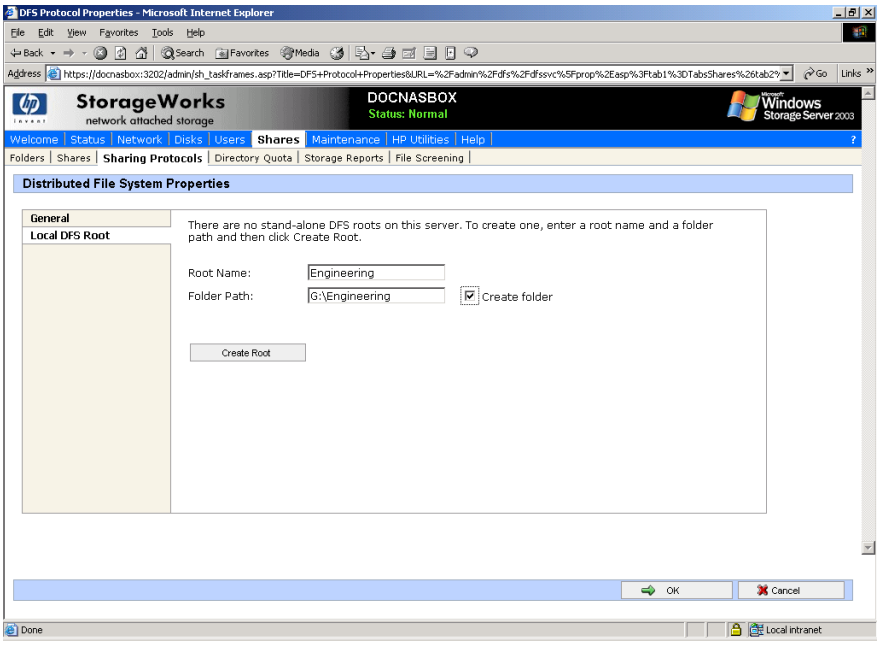

DFS Protocol Properties - Microsoft Internet Explorer
File Edit View Favorites Tools Help
StorageWorks
network attached storage
DOCNASBOX
Status: Normal
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening
Distributed File System Properties
General
Local DFS Root
There are no stand-alone DFS roots on this server. To create one, enter a root name and a folder path and then click Create Root.
Root Name: Engineering
Folder Path: G:\Engineering
Create folder
Create Root
OK
Cancel
Done
Local intranet

Figure 77: Local DFS Root tab

4. On the Local DFS Root tab, type the name of the DFS root in the **Root name** box.
5. In the **Folder path** box, type the path of the folder that corresponds to the root. Click **Create folder** if the folder does not exist.
6. Choose Create DFS Root, and then choose **OK**.

Deleting a Local DFS Root

The WebUI enables the deletion of a local stand-alone DFS root on the server only. The Distributed File System administrative tool must be used to manage Domain DFS Roots. Hence, if there is more than one root on the server, the first root (in alphabetical order, with local stand-alone roots grouped ahead of domain roots) will be available to be deleted. If only domain roots exist on the server, the first domain root will be listed, but it cannot be deleted using the WebUI. The WebUI can only be used to manage local stand-alone DFS roots.

To delete a local DFS root:

1. On the primary navigation bar, choose **Shares**.
2. Choose **Sharing Protocols**.
3. Select **DFS**, and then choose **Properties**. On the Local DFS Root tab, choose **Delete Root**.
4. Choose **OK**.

Publishing a New Share in DFS

Once a root has been established either on the local machine or one in the network, shares can be published in order to extend the virtual name space. For example, several shares can be created for a DFS root labeled “Engineering.” The shares might be titled “Documentation,” “Technical Specs,” and “Project Info.” When mapping to *computername**engineering*, all three of these shares would be found under the mapped drive even though they exist on different NAS devices, drives or shares points. To publish a share in a DFS root:

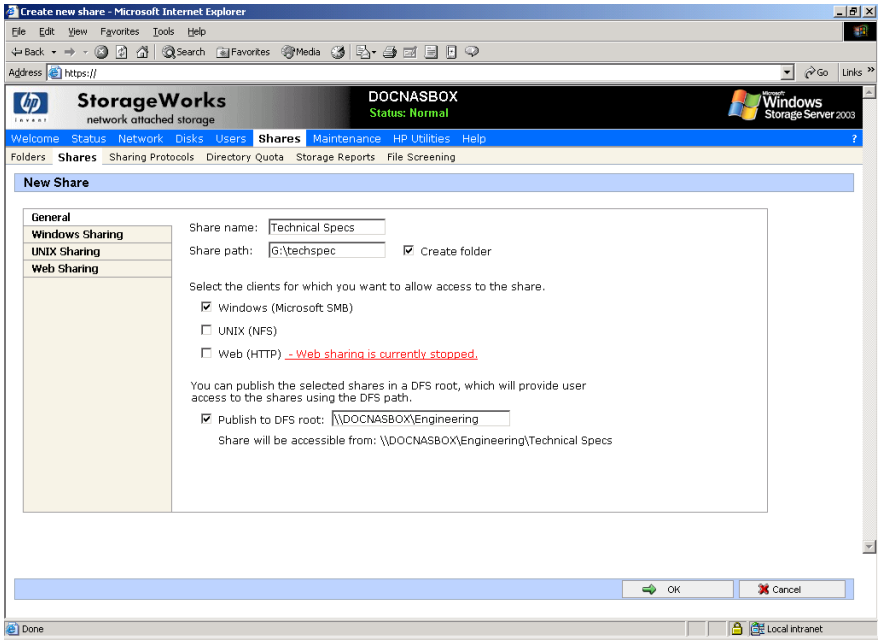

Create new share - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
DOCNASBOX
Status: Normal
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Folders Shares Sharing Protocols Directory Quota Storage Reports File Screening
New Share
General
Windows Sharing
UNIX Sharing
Web Sharing
Share name: Technical Specs
Share path: G:\techspec
Create folder
Select the clients for which you want to allow access to the share.
Windows (Microsoft SMB)
UNIX (NFS)
Web (HTTP) - Web sharing is currently stopped.
You can publish the selected shares in a DFS root, which will provide user access to the shares using the DFS path.
Publish to DFS root: \\DOCNASBOX\Engineering
Share will be accessible from: \\DOCNASBOX\Engineering\Technical Specs
OK
Cancel
Done
Local intranet

Figure 78: DFS share example

1. Select **Shares** from the WebUI.
2. Type in a new share name
3. Type in a folder name (select the checkbox **Create folder** if appropriate)
4. Verify that the Windows checkbox is selected. (DFS is dependent on the SMB protocol)
5. Under DFS, check the box if unchecked.

Note: The default behavior can be set to publish all shares to DFS. In this case the box will be checked. See the section above **Setting DFS Sharing Defaults.**

---

6. Enter in the name of the DFS root to publish the share (“Engineering” in this example). The network name will be displayed below the entry.
7. Click **OK**.

A share name will be published in the namespace.

To view the namespace, map a drive to the DFS root. All published shares will be seen in the namespace. See the example in Figure 79.

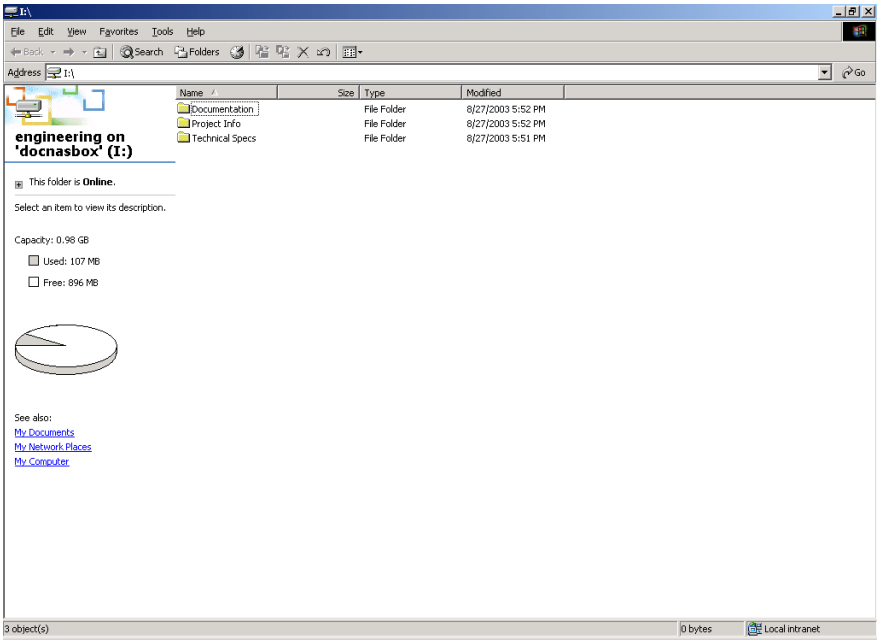


Figure 79: DFS share example, mapped drive

In this case, Documentation exists on *G:\documentation*, Technical Specs exists on *G:\technical specs* and Project Info exists on *C:\project info* on the local machine but they are all accessible via *\\DOCNASBOX\engineering*.

Publishing an Existing Share in DFS

To enable an existing shares for DFS, perform the following steps:

1. Select **Shares** from the WebUI.
2. Select the target share from the table and select **Publish in DFS**.
3. Enter the name of the DFS root to publish the share too.
4. Click **OK**.

The share will appear in the DFS underneath the DFS root.

Removing a Published Share from DFS

Once a share is published in DFS, it may be removed from the virtual namespace via the Shares Property page. To remove a share from DFS perform the following steps:

1. Select **Shares** from the WebUI.
2. Select the target share from the table and select properties.
3. Uncheck the box entitled Publish to DFS root.
4. Click **OK**.

The share will no longer appear in the DFS.

Storage Management

The storage management features built into the NAS 2000s are composed of three main features and are applicable at the directory level of a share. These features include:

- Directory Quotas
- File Screening
- Storage Reports

Each of these feature sets are describe below. For procedures and methods, refer to the online help available within the web UI via the ? in the right hand corner of each accompanying feature management page.

Directory Quotas

Directory quotas provide a way to limit and monitor space consumed by all files in a folder. For information on setting quotas on volumes, see Chapter 5.

Directory quotas limit the size of the managed object regardless of who writes to or who owns files in the managed object. For example, if a 50MB directory quota is set on the managed object *c:\users\JDoe*, that directory and all its contents will be limited to 50MB regardless of who owns the files in that directory or who writes files to that directory.

Directory quotas allow for the addition, deletion, monitoring, and changing of space limits for selected directories on the NAS server. Directory quotas provide disk space monitoring and control in real time, and support active and passive limits with two real-time space alarms.

The Directory Quota feature includes the following components:

- Active and passive space limits on directories
- Best practice storage resource management policies
- A severe alarm threshold
- A warning alarm threshold
- Auto discovery of drives
- Customized messages
- Alarms sent to the event log
- Alarms sent to the user
- Storage reports that can be sent to an intranet Web site
- Custom script support

The directory quota set on the system partition always has a passive limit and uses device size (capacity). If the system does not have sufficient quota to write files, it may fail. Also, if the system partition does not have enough space to write temporary files during boot, the system may not restart. Avoid this by using caution when placing quotas on the system directories.

Directory quotas use each file's allocation size to determine how much space is used. The allocation size is slightly larger than the actual space used as displayed by Windows Explorer and other Windows programs for the data in a file. This discrepancy may cause some confusion, but the Directory Quota feature is correctly charging the user for the amount of disk space actually consumed to store a file. Large cluster sizes on file allocation table (FAT) file systems may add to the confusion because the entire cluster is always allocated, regardless of the file size. NTFS file systems store very small files in the index file and typically have more reasonable cluster sizes.

Because of the differences in the amount of storage requested for a file extension operation and the amount actually allocated by Windows 2003 for that extension, the user may be allowed to exceed his quota by as much as one cluster. For example, assume the user has a quota of 100 KB and has used 96 KB on a file system with a cluster size of 8 KB. The user creates a file of 1 KB. Windows 2003 requests 1024 bytes be allocated for the file. Since this is less than the remaining quota for the user, the operation is allowed to continue. However, if the cluster size is 8 KB, Windows 2003 will actually allocate 8 KB for the file. The user has now used 104 KB, and while this is allowed, future attempts to create or extend files will fail.

Establishing Directory Quotas

Directory quotas are established in a two part fashion. First a policy is defined using the policies selection from the Directories Policy Page. After a policy is established it can be assigned to a particular directory via the WebUI "New Directory Quota Wizard". By default there are a number of predefined policies, these policies include:

- 100 MB Limit
- 500 MB Limit
- Best Practices Report
- Default
- Monitor Directory
- Partition Alert

Each of these policies provides an example of a particular policy type. Custom policies should be created to meet the needs of the environment.

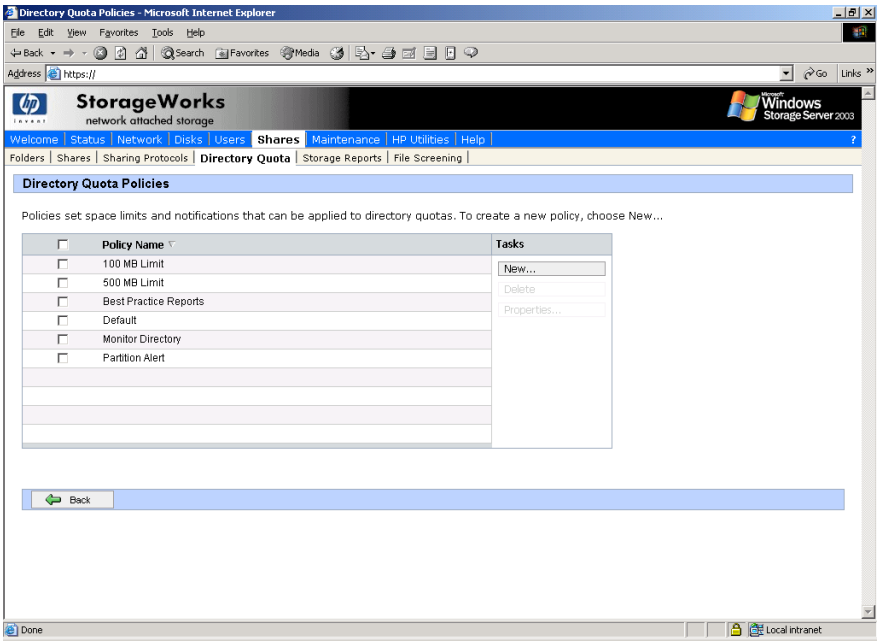


Figure 80: Policies Main Page

Within each policy, there are a number of configuration screens that are presented in the form of a wizard. The wizard collects the following information to create a policy:

- Name of Policy
- Disk space limit and Unit of measurement
- Passive limit (If selected the limit will issue warnings but will not prevent access.
- Alarm Threshold for severe and warning messages
- Notification for severe and warning messages

The notification field allows for the creation of a message to be sent to the eventlog of the server or via Netbios as a pop up on the client machine. It should be noted that Netbios is not supported in all customer environments and the pop up function may not be supported.The notification includes macro functionality and variable definitions for user custom messages. The help function (?) in the right hand corner of the UI provides an online guide to building these macro function messages under the topic “Directory Quota Alarm Notification”.

To modify any of these settings at a later time the properties button may be selected for a particular policy or quota. In addition, to policy settings for existing shares, default policies can be set in advance for new devices added to the system via the preferences button on the Directory Quota Page.

File Screening

File screening allows the administrator to limit or monitor files based on extension, for example disallow all .pst and .mp3 files. It should be noted that the filter is merely based on extensions and not the content of the files. Hence, if a file extension is renamed away from .mp3 for example to mpp, the filter software will allow the file to be stored. A complete online help guide in the WebUI is provided for file screening via the ? in the right hand corner of the UI.

File screening is established in the policy settings. Screening groups contain a collection of authorized and un-authorized file extensions. Filters determine which folders to exclude. Alarms, similar to the actions when a quota threshold is exceeded, can be set up when an unauthorized file type is set up.

File screening includes the following features:

- Active and passive file screening on directories
- Best practice file screening policies
- Notification alarm when file screening policy is violated
- Audit database containing screened files
- Customized alarm messages
- Alarm messages to the event log
- Alarm messages to a user
- Storage reports when alarm is activated and sent to intranet Web site
- Custom script when alarm is activated
- Real time monitoring of file screening activity

Use caution when placing screening parameters on the system partition. If certain classes of files are screened from the system partition, the operating system may not have the access to save temporary working files. It is a good idea to exclude systems directories from screening. Another option is to create a passive screening policy that allows files to be saved but the file activity to be logged.

File Screening essentially has the same feature sets as directory quotas with one exception. Groupings of file types are first created, such as multimedia files, graphics, etc. These groups are then placed in a particular policy. A file screen is then enabled on a directory and the various policies are applied for a particular directory. Lastly, the same types of alert notification is allowed as in the case of the directory quotas. See the online help for additional information.

Storage Reports

Storage reports allow the administrator to analyze the contents of the storage server via standard reports for common tasks. The reports can be displayed using text, simple HTML tables, or Active HTML. When using Active HTML, the ActiveX control provides graphs. A complete online help guide in the WebUI is provided for reporting via the ? in the right hand corner of the UI.

Reports can be scheduled, or produced on demand.

Storage reports address disk usage, wasted space, file ownership, security, and administration. Reports can run interactively, schedule on a regular basis, or run as part of a storage resource management policy when disk space utilization reaches a critical level.

Storage reports may be presented in Hyper Text Markup Language (HTML) and text (.txt) formats. The output formats can be e-mailed to a list of users.

The following features are included with storage reports:

- Best practice storage resource management reports
- Integration with best practice storage resource management policies
- Scheduled storage reports
- Storage reports sent to an intranet Web site
- Storage reports sent to users through e-mail

Note: Large storage reports should be scheduled for off-hours.

Print Services

Printer services are a new feature added to the NAS 2000s that has not been available previously. The new service supports network printers only and is not intended for use with locally attached printers (USB or Parallel port connected).

If the NAS 2000s is a part of an Active Directory domain vs Workgroup, the NAS server enables the following management features:

- Restrict access to a printer based domain user accounts
- Publish shared printers to Active Directory to aid in search for the resource

Before adding a print server role the following check list of items should be followed:

1. **Determine the operating system version of the clients that will send jobs to this printer**. This information is used to select the correct client printer drivers for the client and server computers utilizing the printer. Enabling this role on the print server allows for the automatic distribution of these drivers to the clients. Additionally, the set of client operating systems determines which of these drivers need to be installed on the server during the print server role installation.
2. **At the printer, print a configuration or test page that includes manufacturer, model, language, and installed options**. This information is needed to choose the correct printer driver. The manufacturer and model are usually enough to uniquely identify the printer and its language. However, some printers support multiple languages, and the configuration printout usually lists them. Also, the configuration printout often lists installed options, such as extra memory, paper trays, envelope feeders, and duplex units.
3. **Choose a printer name**. Users running Windows-based client computers choose a printer by using the printer name. The wizard that you will use to configure your print server provides a default name, consisting of the printer manufacturer and model. The printer name is usually less than 31 characters in length.
4. **Choose a share name**. A user can connect to a shared printer by typing this name, or by selecting it from a list of share names. The share name is usually less than 8 characters in length for compatibility with MS-DOS and Windows 3.x clients.
5. (Optional) **Choose a location description and a comment**. These can help identify the location of the printer and provide additional information. For example, the location could be “Second floor, copy room” and the comment could be “Additional toner cartridges are available in the supply room on floor 1."

Configuring the Print Server

To set up a print server:

1. Click **Start > Settings > Control Panel**, double-click **Administrative Tools**, and then double-click **Manage Your Server**.
2. Click on **Add or Remove a Roll**.
3. A wizard will start. Click **Next**.
4. Select Printer Server from the list of Server Roles and click **Next**.
5. Select Windows 2000 and Windows XP clients only and click **Next**.

Note: While the "All Windows" support may be selected at this step, it is more efficient to add the alternative operating systems on each printer after the wizards are complete. See section below on "Adding Additional Operating System Support".

6. Click **Next on the Summary page** and an Add Printer Wizard will start.
7. Select Local Printer and uncheck "automatically detect install my plug and play printers" click **Next**.

Note: Local Printer is used to create a TCP/IP port connections to a network enabled printer over the network. The NAS 2000s only supports network attached printers and does not support directly connected printers via USB or Parallel Port.

8. Select **Create a new port**, and select **Standard TCP/IP Port** (recommended).
9. The Add Standard TCP/IP Printer Port Wizard starts. Click **Next**.
10. Type the name or IP address of the printer. The IP address is usually listed on the printer configuration page. The wizard completes the Port Name field. Click **Next**.
11. The wizard attempts to connect to the printer. If the wizard is able to connect, the **Completing the Add Standard TCP/IP Printer Port** Wizard page appears, and click **Finish**. If the wizard is not able to connect, the **Additional Port Information Required** page appears.
    a. Verify that the ip address or name that was entered is correct.
    b. Select **Standard** to identify the printer network adapter. A list of manufacturers and models of the network adapters will be displayed. Select the appropriate printer from the Standard list.
    c. If the printer network adapter uses nonstandard settings, click **Custom** and then click **Settings**. The **Configure Standard TCP/IP Port Monitor** page appears. Specify the settings that are recommended by the manufacturer of the printer network adapter, and then click **OK**.
    d. Click **Next**.
12. Select the manufacturer and the type of printer from the presented list, click **Next**. If the printer does not exist in the list, click have disk and load the drivers or select a compatible driver.
13. Enter the name of the desired printer to be presented on the NAS device, click **Next**.
14. Enter a Share Name for the printer that will used on the network, click **Next**.
15. Enter a location description and a comment, click **Next**.
16. Select Print a test page and click **Next**.
17. Uncheck the restart the add printer wizard if adding only one printer, click **Finish**.
18. A test page will printer, click ok if the page printed otherwise select troubleshoot.
19. If the restart the add printer wizard was selected the wizard will restart to add an additional printer. Repeat the steps above for adding an additional printer.

Removing the Print Server Role

To remove the print server role:

1. Click **Start > Settings > Control Panel**, double-click **Administrative Tools**, and then double-click **Manage Your Server**.
2. Click on **Add or Remove a Roll**.
3. A wizard will start. Click **Next**.
4. Select **Printer Server** from the list of Server Roles and click **Next**.
5. Select the checkbox **Remove the printer role**, click **Next**.
6. The Printer role will be removed, click **Finish**.

Adding an Additional Printer

To add additional printers to the NAS device:

1. Select **Start > Settings > Printers and Faxes > Add Printer**.
2. The add printer wizard will start. Click **Next**.
3. Select Local Printer and uncheck “automatically detect install my plug and play printers” click **Next**.

Note: Local Printer is used to create a TCP/IP port connections to a network enabled printer over the network. The NAS 2000s only supports network attached printers and does not support directly connected printers via USB or Parallel Port.

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4. Select **Create a new port**, and select **Standard TCP/IP Port** (recommended).
5. The **Add Standard TCP/IP Printer Port** Wizard starts. Click **Next**.
6. Type the name or IP address of the printer. The IP address is usually listed on the printer configuration page. The wizard completes the Port Name field. Click **Next**.
7. The wizard attempts to connect to the printer. If the wizard is able to connect, the Completing the **Add Standard TCP/IP Printer Port** Wizard page appears, and click **Finish**. If the wizard is not able to connect, the **Additional Port Information Required** page appears.
   a. Verify that the ip address or name that was entered is correct.
   b. Select **Standard** to identify the printer network adapter. A list of manufacturers and models of the network adapters is displayed. Select the appropriate printer from the Standard list.
   c. If the printer network adapter uses nonstandard settings, click **Custom** and then click **Settings**. The **Configure Standard TCP/IP Port Monitor** page appears. Specify the settings that are recommended by the manufacturer of the printer network adapter, and then click **OK**.
   d. Click **Next**.
8. Select the manufacturer and the type of printer from the presented list, click **Next**. If the printer does not exist in the list, click **have disk** and load the drivers or select a compatible driver.
9. Enter the name of the desired printer to be presented on the NAS device, click **Next**.

10. Enter a Share Name for the printer that will used on the network, click **Next**.
11. Enter a location description and a comment, click **Next**.
12. Select **Print a test page** and click **Next**.
13. Click **Finish**. A test page prints. Click **OK** if the page printed otherwise select **Troubleshoot**.

Adding Additional Operating System Support

By default, support is added for Windows 2000 and Windows XP. If the client base is composed of other Windows operating systems, additional printer drivers will need to be loaded. To load an additional driver for client download:

1. Select **Start > Settings > Printers and Faxes**, right-click on the printer to manage.
2. Select **Properties**.
3. Select the **Sharing** tab.
4. Select **Additional Drivers**.
5. Select the desired operating systems and click **OK**.
6. A dialog will appear to add the additional drivers from disk.

Installing Print Services for UNIX

1. Log on as administrator or as a member of the Administrators group.
2. Click **Start > Control Panel**, and then click **Add or Remove Programs**.
3. Click **Add/Remove Windows Components**.
4. In the **Components** list, click **Other Network File and Print Services** (but do not select or clear the check box), and then click **Details**.
5. In the Subcomponents of **Other Network File and Print Services** list, click to select **Print Services for UNIX**, if appropriate to the print services that you want to install:

   Print Services for UNIX: This option permits UNIX clients to print to any printer that is available to the print server.

Note: When you install Print Services for UNIX, this automatically installs the LPR port and the TCP/IP Print Server service.

---

6. Click **OK**, and then click **Next**.
7. Click **Finish**.

Microsoft Services for NFS

8

Microsoft Services for NFS is a comprehensive software package designed to provide complete UNIX environment integration into a Windows NT, Windows 2000, Windows 2003, or Active Directory domain file server. Services for NFS manages tasks on both Windows and UNIX platforms. Tasks include creating NFS exports from Windows and administering user name mappings.

The following Services for NFS components are included in the NAS 2000s:

- Server for NFS
- User Name Mapping
- NFS Authentication

Server for NFS

Services for NFS enables UNIX clients to access a file share on the NAS server. The Services for NFS server supports NFS Version 2 and Version 3, and supports them both on the TCP and UDP network protocols.

Services for NFS is more fully integrated into the operating system than other third-party NFS server packages. The administrative interface for NFS exports is similar to the Server Message Block (SMB) sharing interface used by Windows platforms. With Server for NFS properly configured, the administrator can create shares that are simultaneously accessible by multiple client types. For example, some of the options for shares include configurations for CIFS/SMB sharing only, simultaneous NFS/CIFS/SMB sharing, simultaneous NFS/CIFS/SMB/HTTP sharing, or simply NFS only sharing.

Authenticating User Access

NFS export access is granted or denied to clients based on client name or IP address. The server determines whether a specific client machine has access to an NFS export. No user logon to the NFS server takes place when a file system is exported by the NFS server. Permission to read or write to the export is granted to specific client machines. For example, if client machine M1 is granted access to an export but client M2 is not, user jdoe can access the export from M1 but not from M2.

Permissions are granted on a per-export basis; each export has its own permissions, independent of other exports on the system. For example, file system a can be exported to allow only the Accounting department access, and file system m can be exported allowing only the Management department access. If a user in Management needs access to the Accounting information, the A export permissions can be modified to let that one user's client machine have access. This modification does not affect other client access to the same export, nor does it allow the Management user or client access to other exports.

After the client machine has permission to the export, the user logon affects file access. The client machine presents the UNIX user ID (UID) and group ID (GID) to the server. When the computer accesses a file, the UID and GID of the client are transferred to a Windows user ID and group ID by the mapping server. The ACLs of the file or directory object being requested are then compared against the mapped Windows login or group ID to determine whether the access attempt should be granted.

Note: User credentials are not questioned or verified by the NFS server. The server accepts the presented credentials as valid and correct.

If the NFS server does not have a corresponding UID or GID, or if the administrator has set other conditions to filter out the user, a process called squashing takes effect. Squashing is the conversion of an unknown or filtered user to an anonymous user. This anonymous user has very restricted permissions on the system. Squashing helps administrators manage access to their exports by allowing them to restrict access to certain individuals or groups and to squash all others down to restricted (or no) access. Squashing enables the administrator to allow permissions instead of denying access to all the individuals who are not supposed to have access. See "NFS User and Group Mappings" later in this chapter for specific information about creating and maintaining mappings.

Indicating the Computer to Use for the NFS User Mapping Server

During the processes of starting and installing the NAS 2000s, the name localhost is assigned by default to the computer. It is assumed that the NAS 2000s is the computer that will be used for user name mapping.

If there are other mapping servers and a machine other than the localhost that will store user name mappings, the name of that computer must be indicated, as detailed below:

1. Use **Remote Desktop** to access the **NAS Management Console**, click **File Sharing**, **Microsoft Services for Network File System**. Click **Server for NFS**. Figure 81 is an example of the Server for NFS user interface.
2. In the **Computer** name box of the user-mapping screen, type the name of the computer designated for user mapping and authentication.
3. Localhost is the computer name assigned by default on the NAS 2000s. To control user mapping from a different computer, enter the name of that computer.

Note: If a machine other than the localhost is to be used, make sure that the user name mapping service is installed and running on that machine.

Note: If the authentication software is not installed on all domain controllers that have user name mappings, including Primary Domain Controllers, Backup Domain Controllers, and Active Directory Domains, then domain user name mappings will not work correctly.

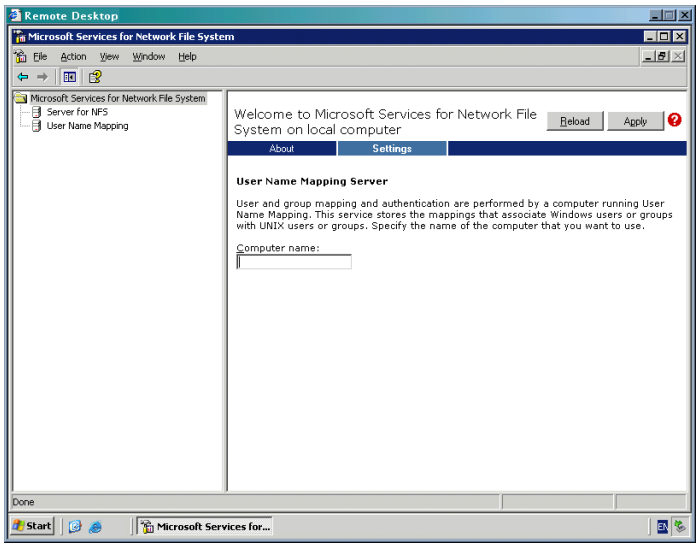
Remote Desktop
Microsoft Services for Network File System
File Action View Window Help
Microsoft Services for Network File System
Server for NFS
User Name Mapping
Welcome to Microsoft Services for Network File System on local computer
Reload
Apply
About
Settings
User Name Mapping Server
User and group mapping and authentication are performed by a computer running User Name Mapping. This service stores the mappings that associate Windows users or groups with UNIX users or groups. Specify the name of the computer that you want to use.
Computer name:
Done
Start
Microsoft Services for...

Figure 81: Microsoft Services for NFS screen, Settings tab

Logging Events

Various levels of auditing are available. Auditing sends Services for NFS events to a file for later review and establishes log-setting behavior. Some behavior examples include events logged and log file size. See the online Services for NFS help for more information.

1. Use Remote Desktop to access the NAS Management Console, click **File Sharing**, **Services for UNIX**, **Server for NFS**. Click the **Logging** tab.
2. To log events to the event viewer application log, click the check box for **Log events to event log**.
3. To log selected event types, click the check box for **Log events in this file** on the screen.
4. Enter a filename or use the default filename provided (*rootdrive\MSNFS\log\nfssvr.log*) and log file size (7 MB default). The default log file is created when the changes are applied.

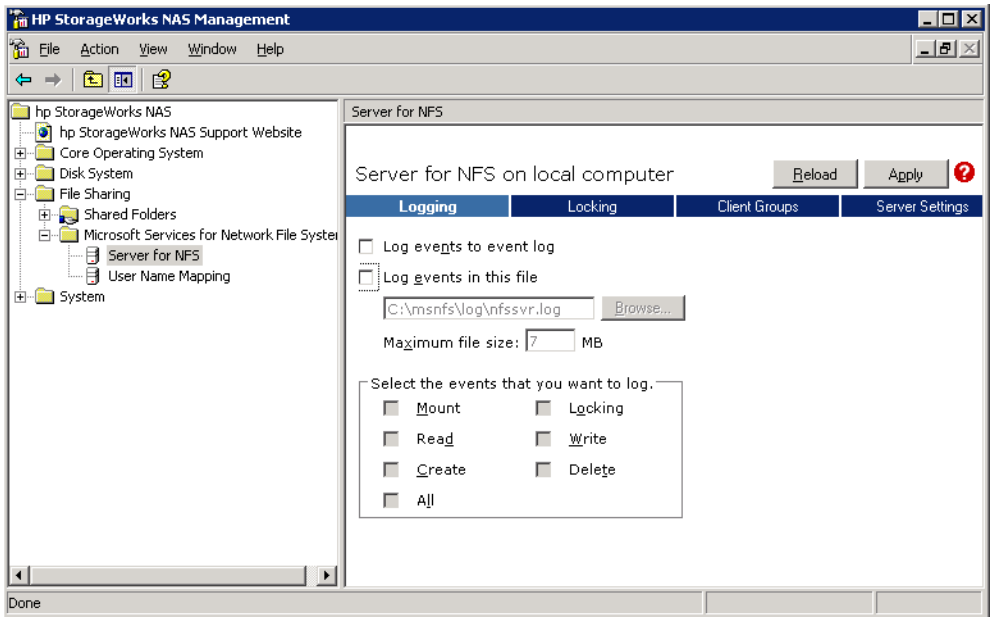

Figure 82: Server for NFS screen, Logging tab

Server for NFS Server Settings

The NAS 2000s has new features for Services for NFS included in the Services for NFS administration GUI. The new features include settings that affect performance, such as toggling between TCP and UDP NFS versions 2 and 3. Other Server for NFS server settings include those that affect how file names are presented to NFS clients, such as allowing hidden files and allowing case sensitive lookups.

Note: The NFS Server service needs to be restarted when changing these settings. Notify users when stopping and restarting the NFS Server service.

Use Remote Desktop to access the NAS Desktop, then click **Start > Programs > Microsoft Services for NFS > Services for NFS Administration > Server for NFS > Server Settings**.

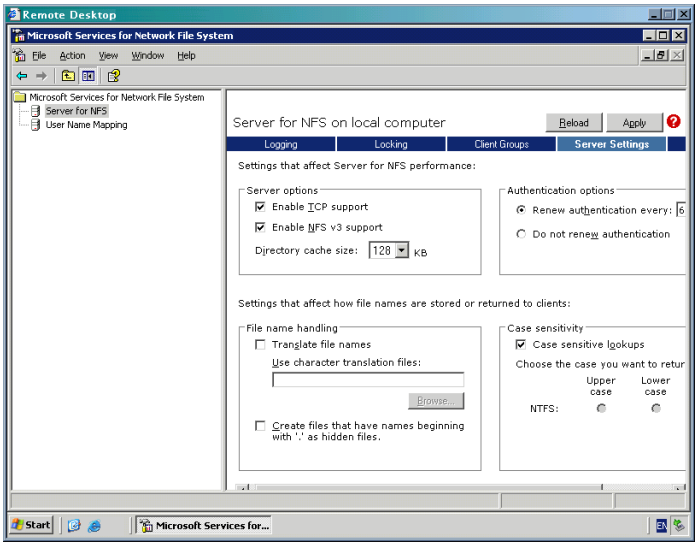

Figure 83: Server for NFS screen, Server Settings tab

Installing NFS Authentication Software on the Domain Controllers and Active Directory Domain Controllers

The NFS Authentication software must be installed on all Primary Domain Controllers (PDCs) and backup domain controllers (BDCs) that have Windows users mapped to UNIX users. This includes Active Directory domains. For instructions on setting up user mappings, see "NFS User and Group Mappings."

Note: If the authentication software is not installed on all domain controllers that have user name mappings, including Primary Domain Controllers, Backup Domain Controllers, and Active Directory Domains, then domain user name mappings will not work correctly.

The Authentication software can be installed in two different ways— the Share method or CD method.

To install the Authentication software on the domain controllers (Share Method):

1. Share out *C:\hpnas\components\SFU 3.0*.
2. Locate the *setup.exe* file located in the *SFU 3.0* directory of the NAS 2000s.
3. On the domain controller where the Authentication software is being installed use Windows Explorer to:
   a. Open the shared directory containing *setup.exe*.
   b. Double-click the file to open it. Windows Installer is opened.

Note: If the domain controller used does not have Windows Installer installed, locate the file InstMSI.exe on the SFU 3.0 directory and run it. After this installation, the Windows Installer program starts when opening setup.exe.

---

4. In the Microsoft Windows Services for UNIX Setup Wizard dialog box, click **Next**.
5. In the User name box, type your name. If the name of your organization does not appear in the Organization box, type the name of your organization there.
6. In the CD Key boxes, type the product key found on the back of the CD-ROM case that is included with the NAS 2000s software, and then click **Next**.
7. Read the End User License Agreement carefully. If you accept the terms of the agreement, click I accept the terms in the License Agreement, and then click Next to continue installation. If you click I do not accept the License Agreement (Exit Setup), the installation procedure terminates.
8. Click Custom Installation, and then click **Next**.
9. In the Components pane, click the down arrow next to Windows Services for UNIX, and then click **Entire component will not be available**.
10. Click the plus sign (+) next to Authentication Tools.
11. In the Components pane, click the plus sign (+) next to Authentication Tools.
12. Click **Server for NFS Authentication**, click **Will be installed on local hard drive**, and then click **Next**.
13. Follow the remaining instructions in the Wizard.

Microsoft Services for Unix 3.0 CD has been included with the NAS 2000s and is needed for the following procedure.

To install the Authentication software on the domain controllers (CD Method):

1. Insert the Microsoft Windows Services for UNIX compact disc into the CD-ROM drive of the domain controller.
2. In the Microsoft Windows Services for UNIX Setup Wizard dialog box, click **Next**.
3. In the User name box, type your name. If the name of your organization does not appear in the Organization box, type the name of your organization there.
4. In the CD Key boxes, type the product key found on the back of the CD-ROM case, and then click **Next**.
5. Read the End User License Agreement carefully. If you accept the terms of the agreement, click **I accept the terms in the License Agreement**, and then click **Next** to continue installation. If you click **I do not accept the License Agreement** (Exit Setup), the installation procedure terminates.
6. Click **Custom Installation**, and then click **Next**.
7. In the Components pane, click the down arrow next to Windows Services for UNIX, and then click **Entire component will not be available**.
8. Click the plus sign (+) next to Authentication Tools.
9. In the Components pane, click the plus sign (+) next to Authentication Tools.
10. Click **Server for NFS Authentication**, click **Will be installed on local hard drive**, and then click **Next**.
11. Follow the remaining instructions in the Wizard.

Note: NFS users can be authenticated using either Windows domain accounts or local accounts on the Windows server. Server for NFS Authentication must be installed on all domain controllers in the domain if NFS users will be authenticated using domain accounts. Server for NFS Authentication is always installed on the computer running Server for NFS.

Understanding NTFS and UNIX Permissions

When creating a NFS export, make sure that the NTFS permissions on the share allows the correct permissions that you want assigned for users/groups. The following will help clarify the translation between Unix and NTFS permissions:

- The UNIX read bit is represented within NTFS as the List Folder/Read Data permission
- The UNIX write bit is represented within NTFS as the Create File/Write Data, Create Folders/Append Data, Write Attributes, and Delete Subfolders and Files permissions
- The UNIX execute bit is represented within NTFS as the Traverse Folder/Execute File permission

NFS File Shares

NFS file shares are created in the same manner as other file shares, however there are some unique settings. Procedures for creating and managing NFS file shares are documented in the same sections as creating file shares for other protocols. See the "Folder and Share Management" chapter for more information.

Note: NFS specific information is extracted from the "Folder and Share Management" chapter and duplicated below.

Complete share management is performed through the **Shares** menu option of the WebUI. Tasks include:

- Creating a new share
- Deleting a share
- Modifying share properties

Each of these tasks is discussed in this section.

Creating a New Share

To create a new NFS file share:

1. From the WebUI main menu, select the **Shares** tab and then select the **Shares** option. The **Shares** dialog box is displayed. From the **Shares** dialog box, click **New**. The **General** tab of the **Create a New Share** dialog box is displayed.

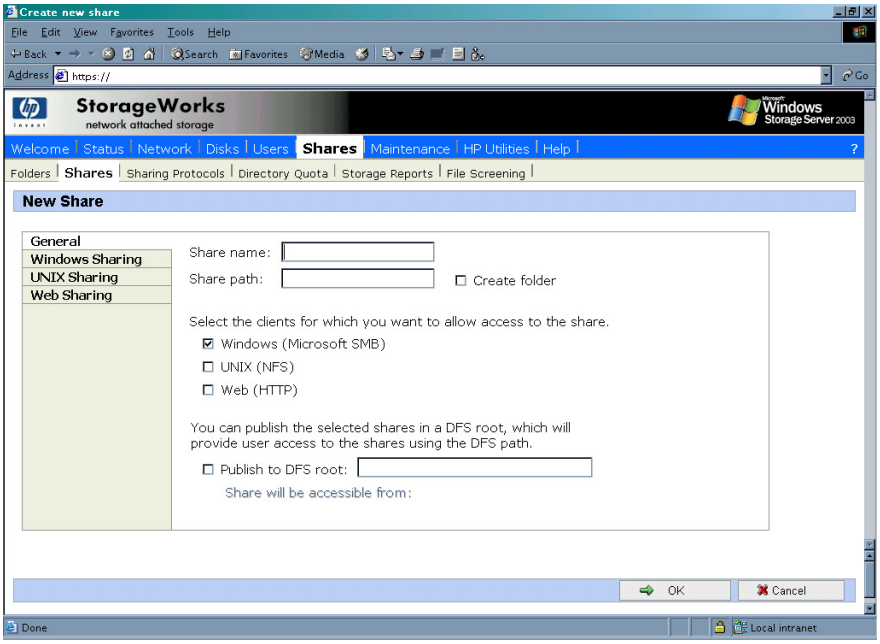
Create new share
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Folders Shares Sharing Protocols Directory Quota Storage Reports File Screening
New Share
General
Windows Sharing
UNIX Sharing
Web Sharing
Share name:
Share path:
Create folder
Select the clients for which you want to allow access to the share.
Windows (Microsoft SMB)
UNIX (NFS)
Web (HTTP)
You can publish the selected shares in a DFS root, which will provide user access to the shares using the DFS path.
Publish to DFS root:
Share will be accessible from:
OK
Cancel
Done
Local intranet

Figure 84: Create a New Share dialog box, General tab

2. In the **General** tab, enter the share name and path. Check the **Unix (NFS)** client protocol check box.

Note: Uncheck the Microsoft SMB option if you do not want to allow SMB access to the share.

Note: NFS service does not support the use of spaces in the names for NFS file shares. NFS translates any spaces in an export into an underscore character. If you plan to use the same name when sharing a folder through SMB, and then exporting it through NFS, do not put spaces in the SMB share name.

To create a folder for the share, check the indicated box and the system will create the folder at the same time it creates the share.

3. Select the **NFS Sharing** tab to enter NFS specific information. See "Modifying Share Properties" for information on this tab.
4. After all share information is entered, click **OK**.

Deleting a Share

Caution: Before deleting a share, warn all users to exit that share. Then confirm that no one is using the share.

To delete a share:

1. From the **Shares** menu, select the share to be deleted, and then click **Delete**.
2. Verify that this is the correct share, and then click **OK**.

Modifying Share Properties

To change share settings:

1. From the **Shares** menu, select the share to modify and then click **Properties**. The **General** tab of the **Share Properties** dialog box is displayed.

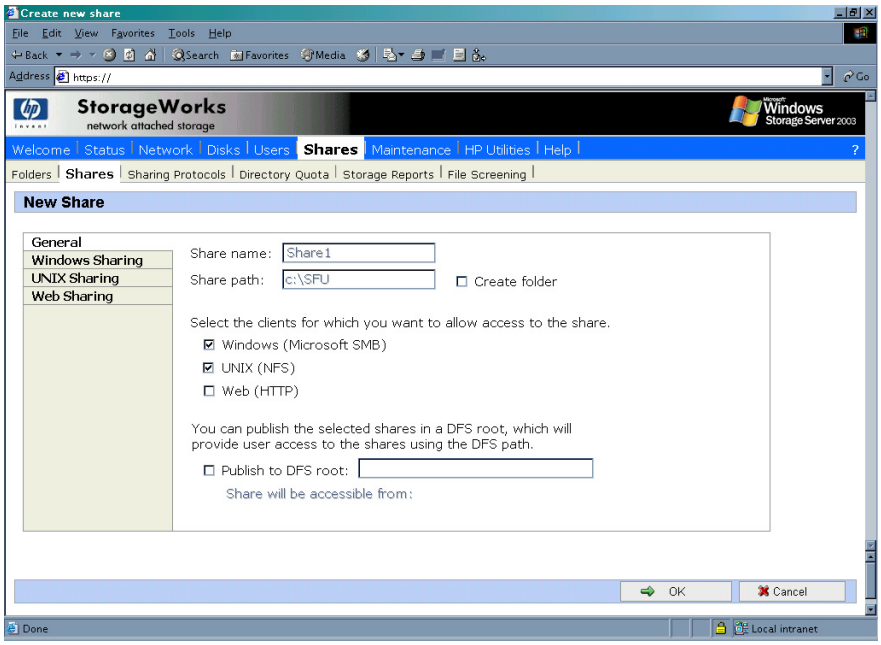
Create new share
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
New Share
General
Windows Sharing
UNIX Sharing
Web Sharing
Share name: Share1
Share path: c:\SFU
Create folder
Select the clients for which you want to allow access to the share.
Windows (Microsoft SMB)
UNIX (NFS)
Web (HTTP)
You can publish the selected shares in a DFS root, which will provide user access to the shares using the DFS path.
Publish to DFS root:
Share will be accessible from:
OK
Cancel
Done
Local intranet

Figure 85: Share Properties dialog box, General tab

The name and path of the selected share is displayed.

2. To enter or change client protocol information, check the **UNIX (NFS)** client type box and then click the **UNIX Sharing** tab.

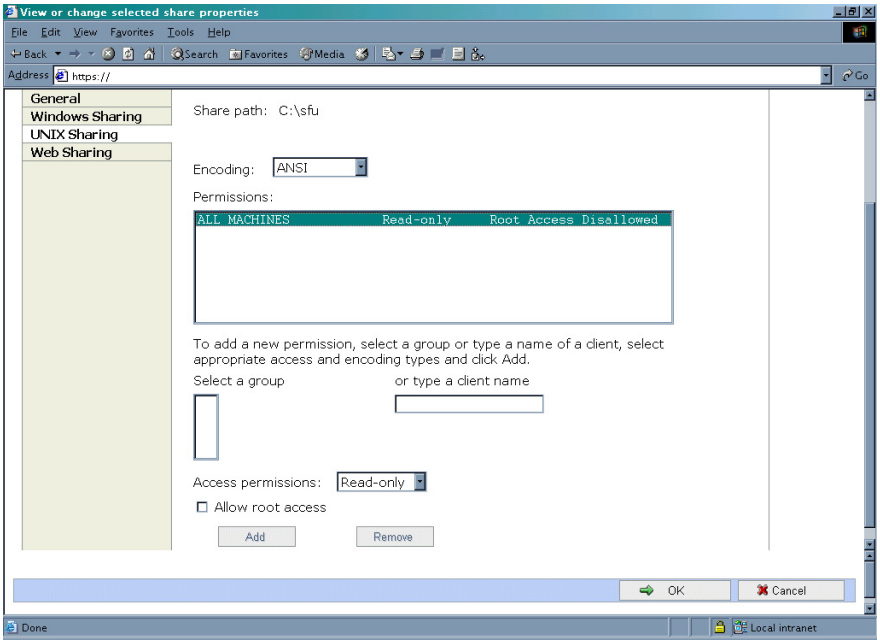

Figure 86: UNIX Sharing tab

3. From the **UNIX Sharing** tab of the **Share Properties** dialog box,
   a. Indicate the allowed clients.

      Select the machine to include in the **Select a group** box or manually enter the NFS client computer name or IP address. Then click **Add**.

   b. Indicate the access permissions.

      Select the machine from the main user display box and then select the appropriate access method from the **Access permissions** drop down box.

      The types of access are:

      - **Read-only**—Use this permission to restrict write access to the share.
      - **Read-write**—Use this permission to allow clients to read or write to the share.
      - **No access**—Use this permission to restrict all access to the share.

4. Select whether or not to allow root access. Check the **Allow root access** checkbox to add the root permission.

   ■ **Read-only + Root**—Use this permission to restrict write access to the share. Use this permission to assign administrative access to the share. This will allow the client computer to have root access to the NFS share. Map the UNIX root user to the Windows user Administrator. Also, map the group that this UNIX root belongs to, to the Windows group Administrator.

   ■ **Read-write + Root**—Use this permission to allow clients to read or write to the share. Use this permission to assign administrative access to the share. This will allow the client computer to have root access to the NFS share. Map the UNIX root user to the Windows user Administrator. Also, map the group that this UNIX root belongs to, to the Windows group Administrator.

5. After all UNIX sharing information is entered, click **OK**.

Encoding Types

Encoding types can be selected using the WebUI. These include the default ANSI as well as EUC-JP. Other encoding types include:

- ANSI (default)
- BIG5 (Chinese)
- EUC-JP (Japanese)
- EUC-KR (Korean)
- EUC-TW (Chinese)
- GB2312-80 (Simplified Chinese)
- KSC5601 (Korean)
- SHIFT-JIS (Japanese)

If the option is set to ANSI on systems configured for non-English locales, the encoding scheme is set to the default encoding scheme for the locale. The following are the default encoding schemes for the indicated locales:

- Japanese: SHIFT-JIS
- Korean: KS C 5601-1987
- Simplified Chinese: GB
- Traditional Chinese: BIG5

NFS Only

Microsoft Services for NFS allows the option of setting up NFS Shares for NFS access only.

The NFS Only option provides faster NFS performance and is intended for NFS clients only. The executable file, *nfsonly.exe*, allows a share to be modified to do more aggressive caching to improve NFS performance. This option can be set on a share-by-share basis. Do not use this function on any file share that can be accessed by any means other than by NFS clients, as data corruption can occur.

The syntax of this command is:

```
nfsonly <sharename> [/enable|disable]
```

- Sharename is the name of the NFS share
- The /enable option turns on NfsOnly for the specified share
- The /disable option turns off NfsOnly for the specified share

The NFS service must be restarted after setting up an NFS Only share. Notify users when the NFS service is restarted.

NFS Protocol Properties Settings

Parameter settings for the NFS protocol are entered and maintained through the WebUI in the **NFS Properties** dialog box. To access the **NFS Properties** dialog box, select **Shares**, **Sharing Protocols**. Then, select the **NFS Protocol** radio button and click **Properties**.

The **NFS Properties** menu is displayed.

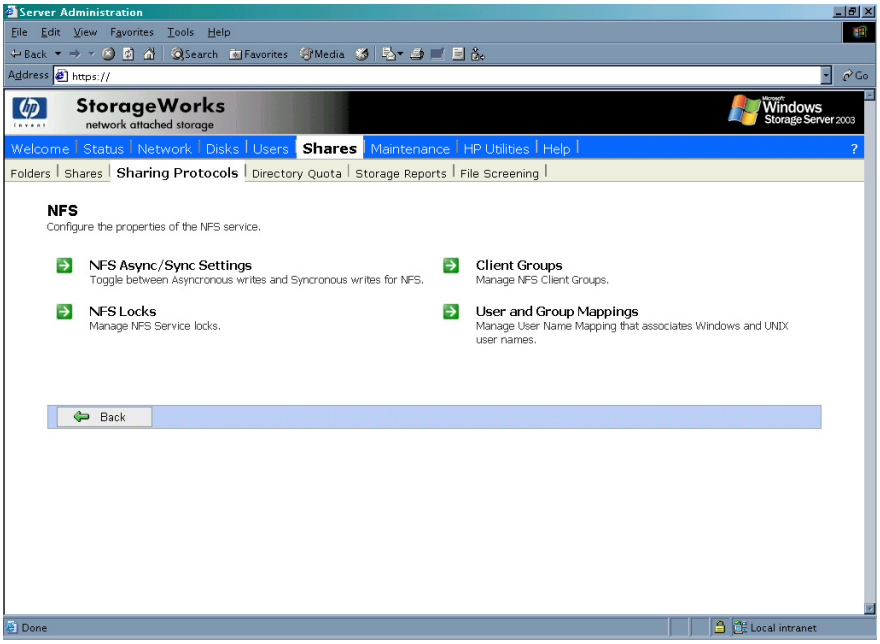
Server Administration
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Folders Shares Sharing Protocols Directory Quota Storage Reports File Screening
NFS
Configure the properties of the NFS service.
NFS Async/Sync Settings
Toggle between Asynchronous writes and Syncronous writes for NFS.
Client Groups
Manage NFS Client Groups.
NFS Locks
Manage NFS Service locks.
User and Group Mappings
Manage User Name Mapping that associates Windows and UNIX user names.
Back
Done
Local intranet

Figure 87: NFS Sharing Protocols menu

NFS properties include:

- Async/Sync Settings
- Locks
- Client Groups
- User and Group Mappings

Settings for asynchronous/synchronous writes and service locks are discussed together in the following paragraphs of this chapter.

Client groups and user and group mappings are each discussed in separate sections later in this chapter.

NFS Async/Sync Settings

As mentioned in a previous section, there are two versions of NFS: Version 2 and Version 3. Version 3 supports additional file operations that Version 2 did not have, such as asynchronous file operations.

To indicate whether to use asynchronous or synchronous write settings:

1. From the WebUI, access the **NFS Protocol Properties** menu by selecting **Shares**, **Sharing Protocols**. Select **NFS Protocol** and then click **Properties**. The **NFS Properties** menu is displayed.
2. In the **NFS Properties** menu, select **NFS Async/Sync Settings**. The **NFS Async/Sync Settings** dialog box is displayed.
3. Select the desired write setting. The default setting is Synchronous writes.

Note: Using synchronous writes allows for greater data integrity. Asynchronous writes will increase performance but will reduce data integrity as the data is cached before being written to disk. Changing the write state causes the NFS service to be restarted. Notify users before toggling this setting.

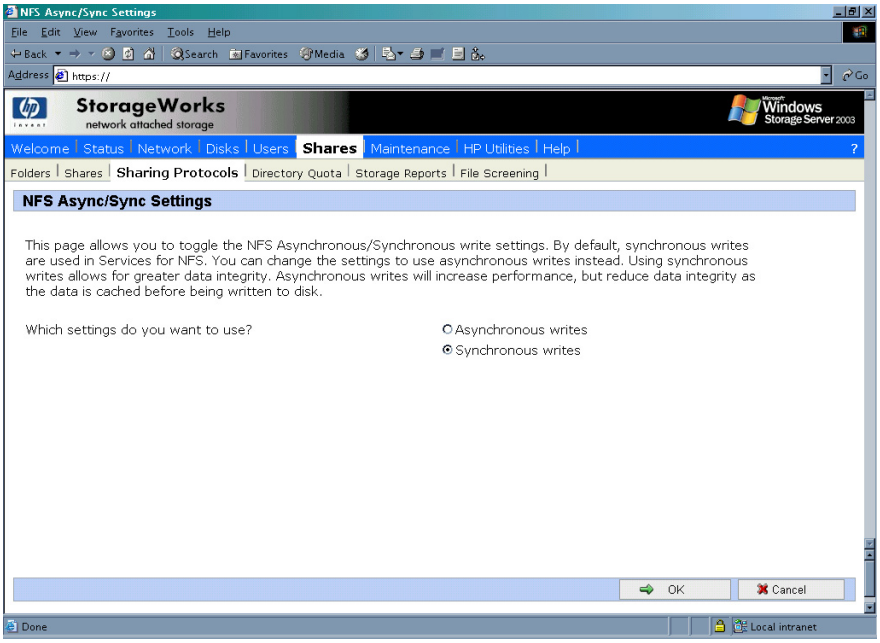
NFS Async/Sync Settings
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
Go
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help | ?
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening
NFS Async/Sync Settings
This page allows you to toggle the NFS Asynchronous/Synchronous write settings. By default, synchronous writes are used in Services for NFS. You can change the settings to use asynchronous writes instead. Using synchronous writes allows for greater data integrity. Asynchronous writes will increase performance, but reduce data integrity as the data is cached before being written to disk.
Which settings do you want to use?
Asynchronous writes
Synchronous writes
OK
Cancel
Done
Local intranet

Figure 88: NFS Async/Sync Settings dialog box

NFS Locks

NFS supports the ability to lock files. File locking helps prevent two or more users from working with the same files at the same time.

NFS locking depends on the software application components to manage the locks. If an application does not lock a file or if a second application does not check for locks before writing to the file, nothing prevents the users from overwriting files.

To enter locking parameters:

1. From the WebUI, access the **NFS Protocol Properties** menu by selecting **Shares**, **Sharing Protocols**. Select **NFS Protocol** and then click **Properties**.

   The **NFS Properties** menu is displayed.

2. In the **NFS Properties** menu, select **NFS Locks**. The **NFS Locks** dialog box is displayed. Figure 89 is an illustration of the **NFS Locks** dialog box.

   All clients that have locks on system files are listed in the **Clients that hold locks** box.

3. To manually clear locks that a client has on files, select the client from the displayed list, and then click **OK**.

4. To indicate the amount of time after a system failure that the locks are kept active, enter the number of seconds in the **Wait period** box.

The NAS 2000s keeps the locks active for the specified number of seconds, while querying the client to see if it wants to keep the lock. If the client responds within this time frame, the lock is kept active. Otherwise, the lock is cleared.

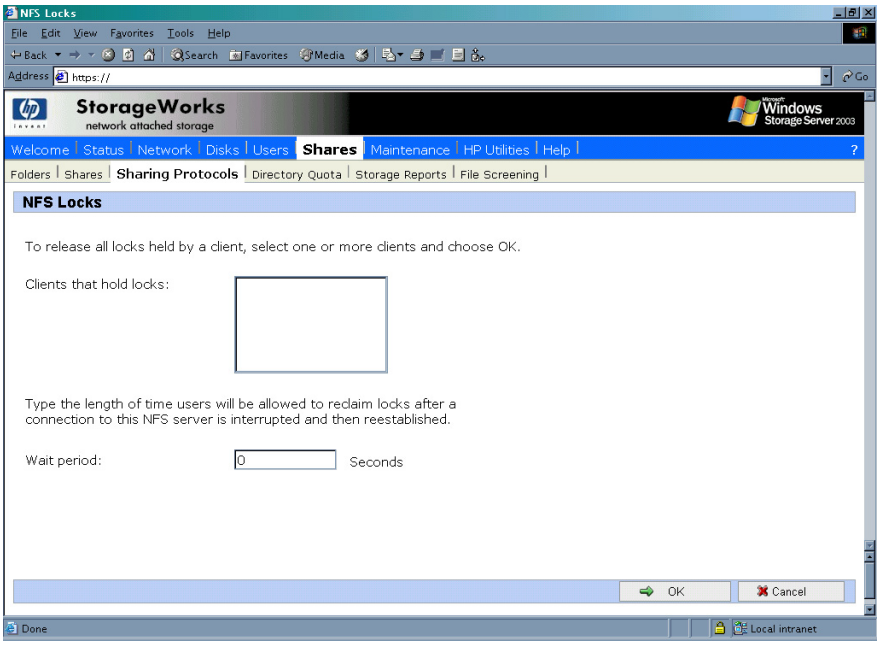
NFS Locks
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
NFS Locks
To release all locks held by a client, select one or more clients and choose OK.
Clients that hold locks:
Type the length of time users will be allowed to reclaim locks after a connection to this NFS server is interrupted and then reestablished.
Wait period:
0
Seconds
OK
Cancel
Done
Local intranet

Figure 89: NFS Locks dialog box

NFS Client Groups

The Client Groups feature gives administrators a method of assigning access permissions to a set of clients. The administrator creates a client group, gives it a name, and then inserts clients into the group by client name or IP address. After the client group is created, the administrator adds or removes permissions for the entire group, instead of allowing or denying access for each individual client machine.

Proper planning includes control over the naming conventions of client groups and users. If the client group is given the same name as a client, the client is obscured from the view of the server. For example, assume that a client d4 exists. If a client group called d4 is created, permissions can no longer be assigned to just the client d4. Any reference to d4 now refers to client group d4.

To manage NFS client groups:

1. From the WebUI, access the **NFS Protocol Properties** dialog box by selecting **Shares**, **Sharing Protocols**. Select **Client Groups**. The **NFS Client Groups** dialog box is displayed.

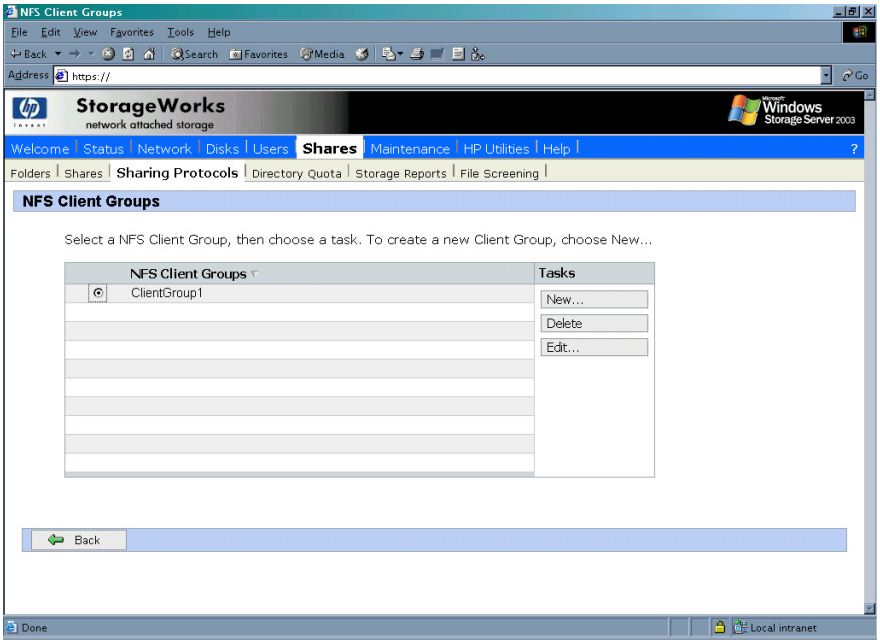

Figure 90: NFS Client Groups dialog box

The following tasks are available:

- Adding a new client group
- Deleting a client group
- Editing client group information

Adding a New Client Group

To add a new client group:

1. From the **NFS Client Groups** dialog box, click **New**. The **New NFS Client Group** dialog box is displayed.

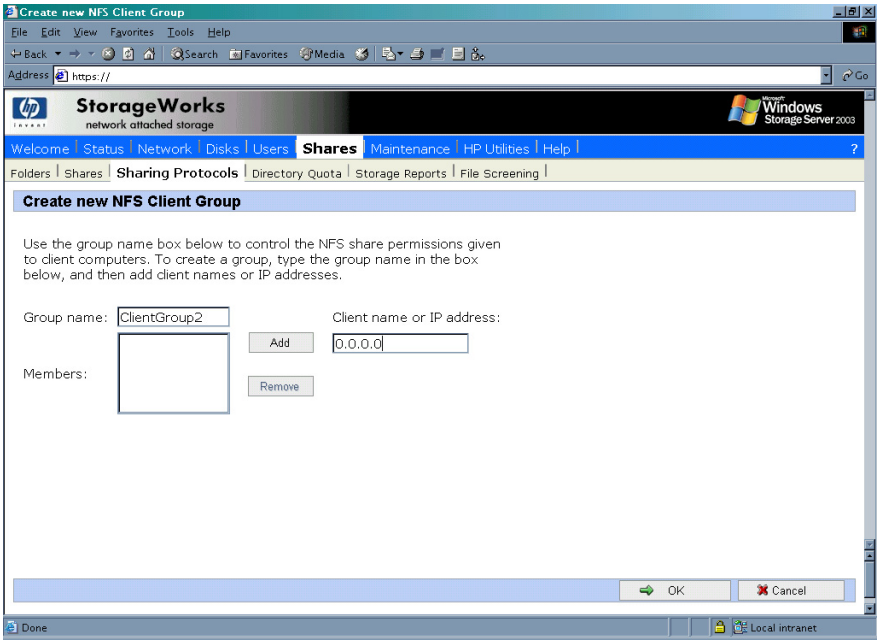
Create new NFS Client Group
File Edit View Favorites Tools Help
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome | Status | Network | Disks | Users | Shares | Maintenance | HP Utilities | Help |
Folders | Shares | Sharing Protocols | Directory Quota | Storage Reports | File Screening |
Create new NFS Client Group
Use the group name box below to control the NFS share permissions given to client computers. To create a group, type the group name in the box below, and then add client names or IP addresses.
Group name: ClientGroup2
Client name or IP address:
Add
0.0.0.0
Members:
Remove
OK
Cancel
Done
Local intranet

Figure 91: New NFS Client Group dialog box

2. Enter the name of the new group.
3. Enter the client name or their IP address.
4. Click **Add**. The system adds the client to the displayed list of members.
5. To remove a client from the group, select the client from the **Members** box and then click Remove.
6. After all clients have been added to the group, click **OK**. The **NFS Client Groups** dialog box is displayed again.

Deleting a Client Group

To delete a group:

1. From the **NFS Client Groups** dialog box, select the group to delete and click **Delete**.
2. A verification screen is displayed. Confirm that this is the correct group and then click **OK**.

   The **NFS Client Groups** dialog box is displayed again.

Editing Client Group Information

To modify the members of an existing client group:

1. From the **NFS Client Groups** dialog box, select the group to modify, and click **Edit.**

   The **Edit NFS Client Group** dialog box is displayed. Current members of the group are listed in the **Members** box.

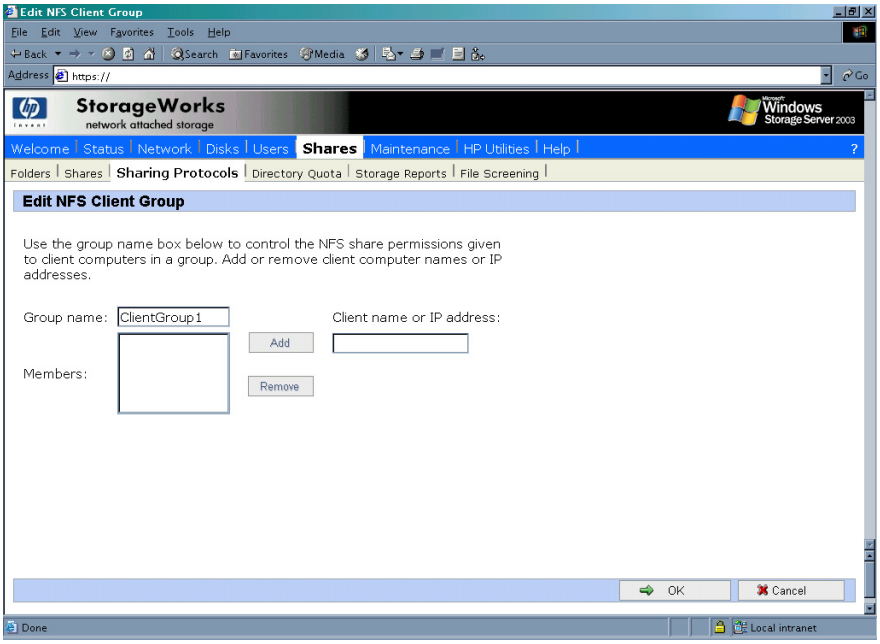
Edit NFS Client Group
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://
StorageWorks
network attached storage
Windows Storage Server 2003
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help
Folders Shares Sharing Protocols Directory Quota Storage Reports File Screening
Edit NFS Client Group
Use the group name box below to control the NFS share permissions given to client computers in a group. Add or remove client computer names or IP addresses.
Group name: ClientGroup1
Client name or IP address:
Add
Members:
Remove
OK
Cancel
Done
Local intranet

Figure 92: Edit NFS Client Groups dialog box

2. To add a client to the group, enter the client name or IP address in the **Client name** box, and then click **Add**. The client is automatically added to the **Members** list.
3. To delete a client from the group, select the client from the **Members** list, and then click **Remove**. The client is removed from the list.
4. After all additions and deletions are completed, click **OK**. The **NFS Client Groups** dialog box is displayed again.

NFS User and Group Mappings

When a fileserver exports files within a homogeneous environment, there are no problems with authentication. It is a simple matter of making a direct comparison to determine whether the user should be allowed access to the file, and what level of access to allow.

However, when a fileserver works in a heterogeneous environment, some method of translating user access is required. User mapping is the process of translating the user security rights from one environment to another.

User name mapping is the process of taking user and group identification from one environment and translating it into user identification in another environment. In the context of UNIX and NFS, user and group identification is a combination of a user ID (UID) and group ID (GID). In Windows environments, user identification is a Security ID (SID) or, in Windows 2000, a Globally Unique Identifier (GUID).

The server grants or denies access to the export based on machine name or IP address. However, after the client machine has access to the export, user-level permissions are used to grant or deny access to user files and directories.

The NAS 2000s is capable of operating in a heterogeneous environment, meaning that it is able to work with both UNIX and Windows clients. Because the files are stored in the native Windows NT file system, the server has to map the UNIX users to Windows users to determine the user access level of the files.

Note: User mapping is not designed to address existing user database problems in the existing environment. All UIDs and GIDs must be unique across all NIS (Network Information Service) domains and all user names must be unique across all Windows NT domains.

The NAS 2000s supports mappings between one or more Windows domains and one or more NIS domains. The default setup supports multiple Windows NT domains to a single NIS domain. For information about users in multiple NIS domains, refer to the Supplemental Help section in the Services for NFS online help.

Types of Mappings

There are three types of mappings. These mappings are listed below in order of the most complex (with the greatest level of security) to the least complex (easiest to manage, but with little security):

- Explicit mappings
- Simple mappings
- Squashed mappings

Explicit Mappings

Explicit mappings are created by the administrator to link Windows and UNIX users. They override simple mappings and are used to map users on the different systems that have unique names.

Simple Mappings

Simple mapping is a direct comparison of user names on the Windows system and the UNIX system. If the names match, the user is assumed to be authentic, and appropriate share access is granted. Simple mapping is an option that the administrator must turn on if it is to be used.

Squashed Mappings

If the NFS server does not have a corresponding UID or GID or if the administrator has set other conditions to filter out the user, a process called squashing takes effect. Squashing is the conversion of an unmapped or filtered user to an anonymous user. This anonymous user has very restricted permissions on the system. Squashing helps administrators manage access to their exports by allowing them to restrict access to certain individuals or groups and to squash all others down to restricted (or no) access. Squashing enables the administrator to allow permissions instead of denying access to all the individuals who are not supposed to have access.

Figure 93 is a diagram showing an example of how the mapping server works for an ls -al command.

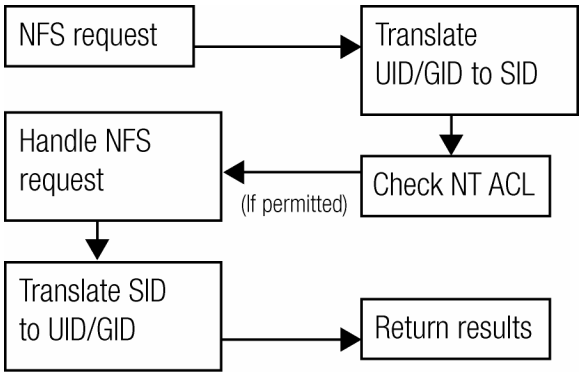

Figure 93: Mapping Server "ls -al" Command example

A double translation, as illustrated in Figure 93, is sometimes necessary because some commands return user ID information. For example, if the NFS request issued was an `ls -al` command, the return listing of files contains user information (the user and group that own the file). The `ls -al` command is a UNIX command. It returns a long or full listing of all files. Because this information is contained in a Windows NT Access Control List (ACL), it is not UNIX ready. The ACL information has to be converted back to UNIX UIDs and GIDs for the UNIX systems to understand and display the user information.

This second translation is not done for commands that do not return user information. For example, if the NFS request were just to read data from or write data to a file, the second translation would not be performed because there is no returning user information.

User Name Mapping Best Practices

Below is a brief list of suggested practices:

- **Back up user and group mappings**

  To avoid loss of complex advanced mappings in the case of a system failure, back up the mappings whenever the mappings have been edited or new mappings have been added.

- **Map consistently**

  Groups that are mapped to each other should contain the same users and the members of the groups should be properly mapped to each other to ensure proper file access.

  Example using User1 and Group1:

  — Make sure that the Windows User1 is mapped to the corresponding UNIX User1.

  - Make sure that the Windows Group1 is mapped to the corresponding UNIX Group1.
  - Make sure that User1 is a member of Group1 on both Windows and UNIX.
- **Map properly**
  - Valid UNIX users should be mapped to valid Windows users.
  - Valid UNIX groups should be mapped to valid Windows groups.
  - Mapped Windows user must have the Access this computer from the Network privilege, or the mapping will be squashed.
  - The mapped Windows user must have an active password, or the mapping will be squashed.

Creating and Managing User and Group Mappings

To set up and manage user name mappings:

1. From the WebUI, select **Shares**, **Sharing Protocols**. Select **NFS Protocol** and then click **Properties**. The **NFS Properties** menu is displayed.
2. In the **NFS Properties** Menu, select **User and Group Mappings**. The **User and Group Mappings** dialog box is displayed.

   There are four tabs in the **User and Group Mappings** dialog box:

   - **General information**—Sets the mapping information source, which is either NIS or password and group files.
   - **Simple Mapping**—Indicates whether simple mappings are being used.
   - **Explicit User Mapping**—Lists exceptional user mappings that will override the simple user mappings.
   - **Explicit Group Mapping**—Lists exceptional group mappings that will override the simple group mappings.

   Each of these tabs is discussed in the following sections.
3. Enter mapping information on the appropriate tabs, then click **OK**.

General Tab

The user name mapping server translates the UNIX users into Windows users so that the server can determine user access rights to the data.

Within this initial screen, indicate whether the source of mapping information is an NIS server or is a special file with password and group information.

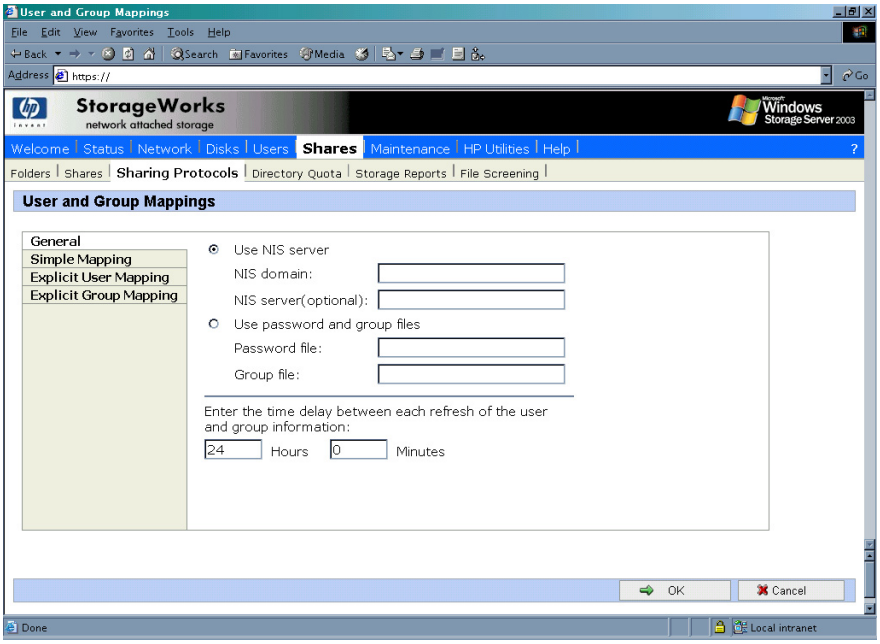

Figure 94: User and Group Mappings dialog box, General tab

From the **General** tab of the **User and Group Mappings** dialog box:

1. If an NIS server is being used:
   a. Select **Use NIS** server.
   b. Enter the NIS domain name.
   c. Enter the NIS server name. This field is optional, but recommended. In the **Hours** and **Minutes** fields, indicate how often the system will connect to the NIS domain to update the user list.
2. If custom password and group files are being used:
   a. Select **User password and group files**.
   b. Enter the path and name of the password file.
   c. Enter the path and name of the group file.
3. After this basic information is entered, click **OK**.

Simple Mapping Tab

Simple (or implicit) mapping is the first level of user name mapping. In simple mode, user and group names that match exactly in name are automatically equated.

While simple mappings are the most easily managed and are the most forthright type of map, security problems can arise. For example, if a UNIX user is coincidentally an exact match of a Windows user, the system will equate them and an inadvertent mapping will occur, granting a user inappropriate access.

- To use simple mappings, the feature must be enabled. If this feature is turned off, the administrator must manually create an explicit map for each user.
- To enable simple mapping, click the **Enable Simple Mapping** option and then select the Windows domain name.

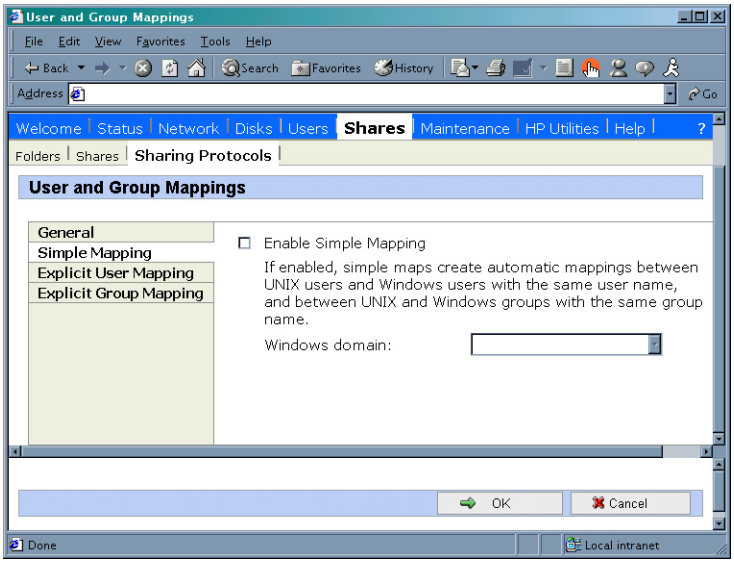
User and Group Mappings
File Edit View Favorites Tools Help
Back Search Favorites History
Address
Go
Welcome Status Network Disks Users Shares Maintenance HP Utilities Help ?
Folders Shares Sharing Protocols
User and Group Mappings
General
Simple Mapping
Explicit User Mapping
Explicit Group Mapping
Enable Simple Mapping
If enabled, simple maps create automatic mappings between UNIX users and Windows users with the same user name, and between UNIX and Windows groups with the same group name.
Windows domain:
OK
Cancel
Done
Local intranet

Figure 95: User and Group Mappings dialog box, Simple Mapping tab

Explicit User Mapping Tab

Explicit (or advanced) mappings allow the administrator to map any user or group manually to any other user and group. Advanced mappings override simple mappings, giving administrators the capability of using simple mapping for most users and then using advanced mappings for the users with unique names on the different systems. Alternatively, simple mapping can be disabled completely, relying solely on explicit mappings. Explicit mappings create the most secure mapping environment.

Security issues seen in simple mappings do not exist in explicit mappings. Explicit user mappings specifically correlate two users together, thus preventing the inadvertent mapping.

To enter explicit user mappings, select the **Explicit User Mapping** tab. Figure 96 is an example of the **Explicit User Mapping** tab.

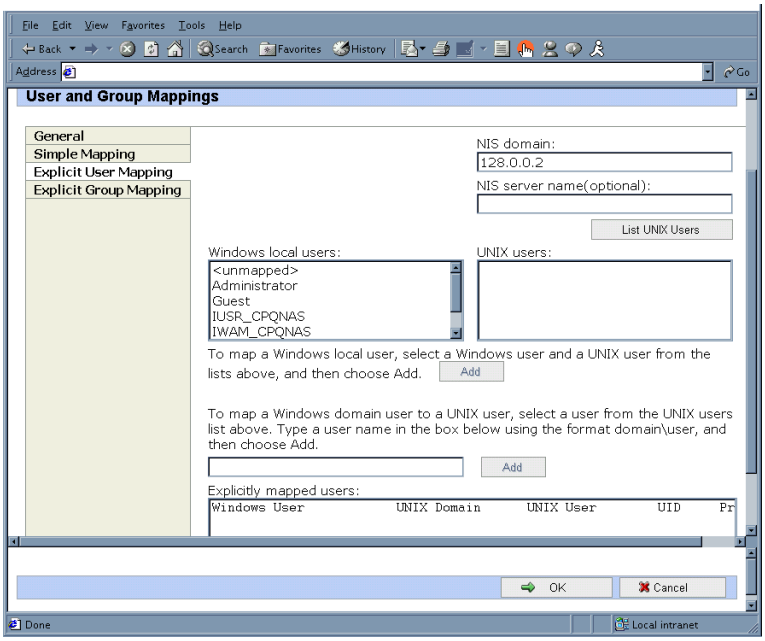

Figure 96: User and Group Mappings dialog box, Explicit User Mapping tab

To create explicit user mappings:

1. Click the **List UNIX Users** button to populate the UNIX users box.
2. To map a local Windows user to a UNIX user, highlight the **Windows user** in the Windows local users box and highlight the UNIX user that you want to map, and then click **Add**. The **Explicitly mapped users** box at the bottom of the screen is populated with the new mappings. Repeat this process until all desired users have been mapped.
3. To map a domain Windows user to a UNIX user, enter the domain and the user name in the box in the middle of the screen (use the Domain\username format) and highlight the UNIX user that you want to map, and then click **Add**. The map is added to the **Explicitly mapped users** box at the bottom of the screen. Repeat this process until all desired users have been mapped.
4. To map multiple Windows users to one UNIX user, one of the mapped Windows users must be set as the primary mapping. To indicate which user map is the primary mapping, highlight the desired map in the **Explicitly mapped users** box, and then click the **Set Primary** button.
5. To delete a map, highlight the map in the **Explicitly mapped users** box, and then click the **Remove** button.
6. After all entries are completed, click **OK** to activate the new entries.

Explicit Group Mapping Tab

To enter explicit group mappings, select the Explicit Group Mapping tab. Figure 97 is an example of the **Explicit Group Mapping** tab.

Explicit mappings allow the administrator to map any user or group manually to any other user and group. Explicit mappings override simple mappings, giving administrators the capability of using simple mapping for most groups and then using explicit mappings to make changes to simple mappings. Simple mapping can be turned off for greater security.

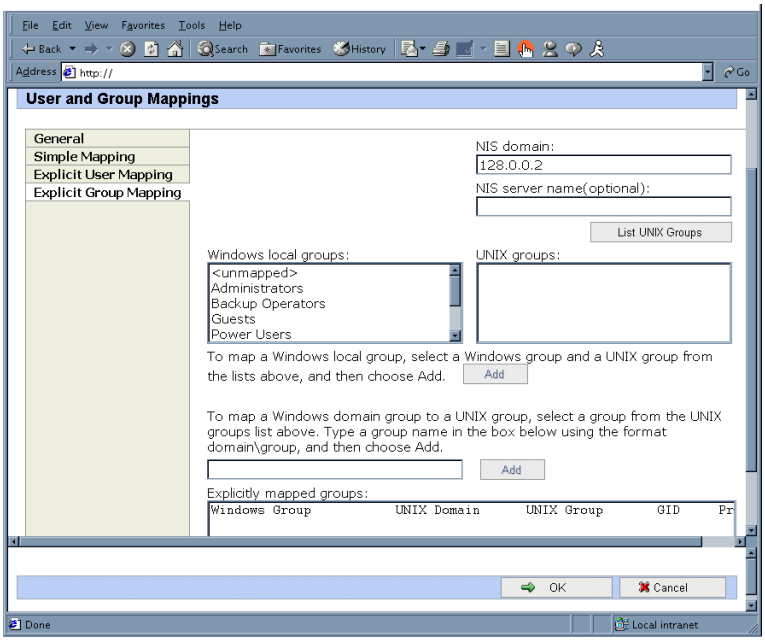

Figure 97: User and Group Mappings dialog box, Explicit Group Mapping tab

To create explicit group mappings:

1. Click the **List UNIX Groups** button to populate the **UNIX Groups** box.
2. To map a local Windows group to a UNIX group, highlight the Windows group in the Windows local groups box and highlight the UNIX group to map, and then click **Add**. The **Explicitly mapped groups** box at the bottom of the screen is populated with the new mappings. Repeat this process until all desired groups have been mapped.
3. To map a domain Windows group to a UNIX group, enter the domain and the group name in the box in the middle of the screen (use the Domain\groupname format) and highlight the UNIX group to map, and then click **Add**. The map is added to the **Explicitly mapped groups** box at the bottom of the screen. Repeat this process until all desired groups have been mapped.
4. To map multiple Windows groups to one UNIX group, one of the Windows groups must be set as the primary mapping. Therefore, to indicate which group map is the primary mapping, highlight the desired map in the **Explicitly mapped groups** box, and then click the **Set Primary** button.
5. To delete a map, highlight the map in the **Explicitly mapped groups** box and then click the **Remove** button.
6. After all entries are completed, click **OK** to activate the new entries.

Backing up and Restoring Mappings

The user name-mapping server has the capability to save and retrieve mappings from files. This capability is useful for backing up mapping settings prior to making changes and for exporting the mapping file from one server to others, using the same mapping information.

The user name-mapping server can save existing mappings to a file or load them from a file and populate the mapping server. This feature is found in the **Map Maintenance** tab of the **User Name Mapping** screen, as shown in Figure 98.

Use **Remote Desktop** to access the **NAS Management Console**, click **File Sharing**, **Microsoft Services for Network File System**. Click **User Name Mapping**, then **Map Maintenance**.

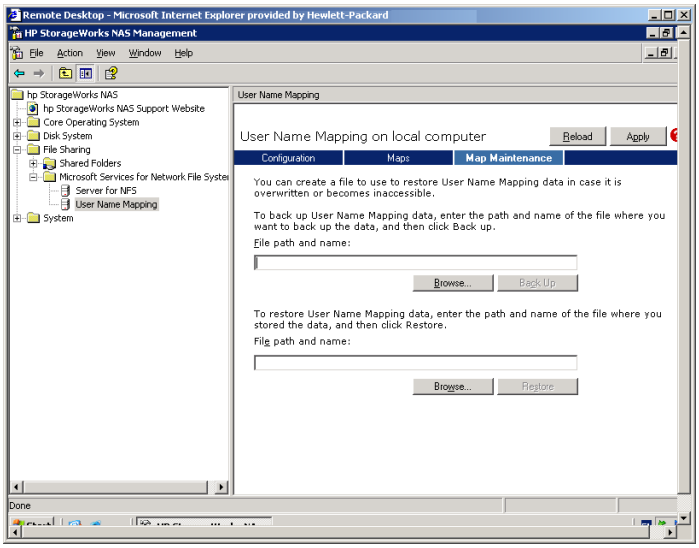
Remote Desktop - Microsoft Internet Explorer provided by Hewlett-Packard
HP StorageWorks NAS Management
File Action View Window Help
hp StorageWorks NAS
hp StorageWorks NAS Support Website
Core Operating System
Disk System
File Sharing
Shared Folders
Microsoft Services for Network File System
Server for NFS
User Name Mapping
System
User Name Mapping
User Name Mapping on local computer
Reload
Apply
Configuration
Maps
Map Maintenance
You can create a file to use to restore User Name Mapping data in case it is overwritten or becomes inaccessible.
To back up User Name Mapping data, enter the path and name of the file where you want to back up the data, and then click Back up.
File path and name:
Browse...
Back Up
To restore User Name Mapping data, enter the path and name of the file where you stored the data, and then click Restore.
File path and name:
Browse...
Restore
Done

Figure 98: User Name Mapping screen, Map Maintenance tab

Backing up User Mappings

1. Select the **Map Maintenance** tab from the **User Name Mapping** screen.
2. Type the path and name of the file to be used for backup in the File path and name field or click **Browse** to locate the file.

Note: If the file is being created for the first time, follow these steps:

---

1. Browse to the target directory.
2. Right-click in the file listing pane, select **New**, **Text Document**. Enter a name for the file and then press **Enter**.
3. Double-click the new file to select it.
4. Click **Backup**.

Restoring User Mappings

User mappings can be restored using the following procedures.

1. Select the **Map Maintenance** tab from the **User Name Mapping** screen.

2. Type the path and name of the file in the File path and name field or click **Browse** to locate the file.
3. After locating the file, click **Restore**.

Creating a Sample NFS File Share

HP recommends performing the following tests to verify that the setup of the shares, user mappings, and permissions grant the desired access to the NFS shares.

1. Create an NFS share. NFS Shares are All Machines, read-only by default.

   See "NFS File Shares" earlier in this chapter for information on creating shares.
2. Create NFS client groups if desired. See "NFS Client Groups" earlier in this chapter.
3. Verify that the NFS share exists.

   Use Remote Desktop to log into the NAS 2000s and access the command line interface:

   `nfsshare <sharename>` (sharename represents the name of the share)
4. Map a user. When creating Active Directory/Domain mappings, ensure that the NFS Authentication software is installed on the domain controllers that have user name mappings. See "Installing NFS Authentication Software on the Domain Controllers and Active Directory Domain Controllers" section. Also, see "User and Group Mappings" in this chapter for instructions on setting up user name mappings.
5. Verify that the mappings exist.

   Use Remote Desktop to log in to the NAS 2000s and access the command line interface:

   `mapadmin list -all`
6. On the Linux/UNIX system, use the mapped user to create a file.
   a. As the root user, mount the share:

      `mount -t nfs <nfs server IP address:/nfs share> /mount point`
   b. Log in as a mapped user.
   c. Change directories to the mount-point directory.
   d. Create the file as the mapped user (example: *file1*).
7. Verify that the same permissions are set up for the user on both the UNIX side and the Windows side.
   a. List the permissions on the UNIX side:

      `ls -l /mount-point/file1`

      (Example screen display: -r--r----- unixuser1 unixgroup1)
   b. List the permissions on the Windows side: (change to the *nfs* share directory)

      From a command line interface accessed from Remote Desktop on the NAS 2000s:

      `cacls file1`

      (Example display: DOMAIN1\Windowsuser1:R)
   c. Compare and verify the permissions from UNIX and Windows.

Remote Desktop

In addition to the WebUI, Remote Desktop is available for remote administration of Services for UNIX. This service let users connect to machines, log on, and obtain command prompts remotely. See Table 12 for a list of commonly used commands.

Using Remote Desktop

Microsoft Remote Desktop can be used to remotely access the NAS 2000s desktop. This provides the administrator flexibility to automate setups and other tasks. Services for NFS file-exporting tasks and other Services for NFS administrative tasks can be accomplished using Remote Desktop to access the Services for NFS user interface from the NAS Desktop or from a command prompt.

Remote Desktop is included in the WebUI of the NAS 2000s. To open a Remote Desktop session, from the WebUI, select **Maintenance**, **Remote Desktop**. See the "Remote Access Methods and Monitoring" chapter for information on setting up and using Remote Desktop.

Table 12 describes some common Services for NFS commands.

Table 12: Command Line Interface Command Prompts

Command	Function
`nfsstat /?`	Learn about viewing statistics by NFS operation type
`showmount /?`	View the format of the command to display NFS export settings on NFS servers
`showmount a`	View users who are connected and what they currently have mounted
`showmount e`	View exports from the server and their export permissions
`rpcinfo /?`	Learn how to display Remote Procedure Call (RPC) settings and statistics
`mapadmin /?`	View how to add, delete, or change user name mappings
`nfsshare /?`	Learn how to display, add, and remove exported shares

NetWare File System Management

9

File and Print Services for NetWare (FPNW) is one part of the Microsoft software package called Services for NetWare. The most common use of the NetWare network operating system is as a file and print server. Customers using NetWare as the platform to host their file and print services have become accustomed to its interface from both a user and an administrator point of view and have built up an investment in NetWare file and print services. File and Print Services for NetWare helps customers preserve their NetWare skill set while consolidating the number of platforms. This reduces hardware costs and simplifies file and print server administration by making the NAS 2000s emulate a NetWare file and print server. FPNW eases the addition of the NAS 2000s into a mixed infrastructure by providing a NetWare user interface (UI) to a Windows 2000-based server; administrators and users see their same, familiar NetWare UI. Additionally, the same logon for clients is maintained without a need for any client configuration changes.

This service also provides the ability to create Novell volumes, which are actually NTFS shares, from which users can map drives and access resources. Novell Login scripts are supported on the NAS 2000s or through an existing NDS (Novell Directory Services) account.

Note: IPX/SPX protocol is required on the Novell servers.

Topics discussed in this chapter include:

- Installing Services for NetWare
- Managing File and Print Services for NetWare
- Creating and Managing NetWare Users
- Managing NCP Volumes (Shares)

Installing Services for NetWare

The installation of FPNW on the NAS 2000s allows for a smooth integration with existing Novell servers. FPNW allows a Windows 2000-based server to emulate a NetWare file and print server to users, clients, and administrators. This emulation allows authentication from Novell clients, the use of Novel logon scripts, the creation of Novell volumes (shares), the use of Novell file attributes, and many other Novell features.

Additional information on Microsoft Directory Synchronization Services and the File Migration Utility can be found at:

www.microsoft.com/WINDOWS2000/guide/server/solutions/NetWare.asp

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Note: The printing capabilities of File and Print Services for NetWare are not supported on the NAS 2000s.

To install Services for NetWare:

1. From the desktop of the NAS 2000s, click **Start > Settings > Network Connections > Local Area Connection**, and then right-click **Properties**.
2. Click **Install**. The **Select Network Component Type** dialog box is displayed.

   Figure 99 is an example of the **Select Network Component Type** dialog box.

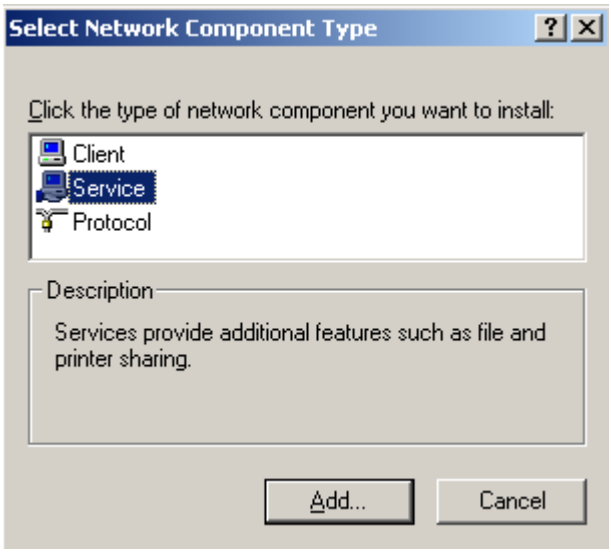


Figure 99: Local Area Connection Properties page, Install option

3. Select **Service** and click **Add**.
4. Click the **Have Disk** icon and navigate to the location of **Services for NetWare**.

   Services for NetWare is located in the path:
   c:\hpnas\components/SFNS5.02/fpnw/netsfn.inf.
5. Select the *NETSFNTSRV* file and click **OK**.

File and Print Services for NetWare should now be displayed as an option to install.

6. Select **File and Print Services for NetWare** and click **OK**.

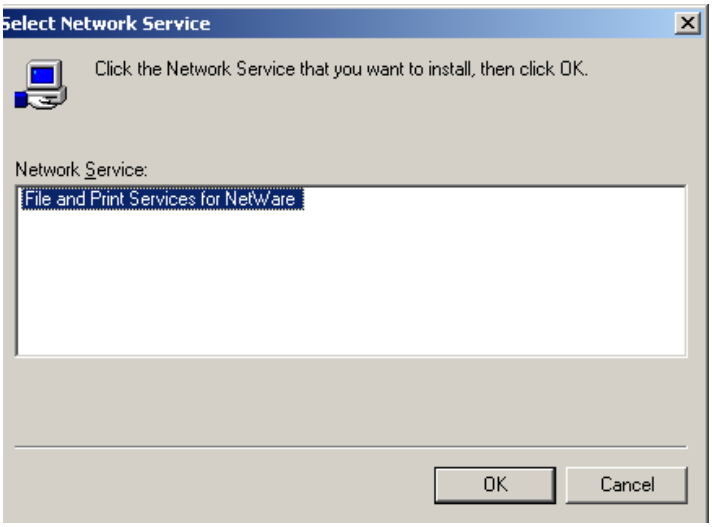

Select Network Service
Click the Network Service that you want to install, then click OK.
Network Service:
File and Print Services for NetWare
OK
Cancel

Figure 100: Installing File and Print Services for NetWare

Managing File and Print Services for NetWare

To access FPNW:

1. From the desktop of the NAS 2000s, click **Start > Settings > Control Panel**, and then double-click **FPNW**.

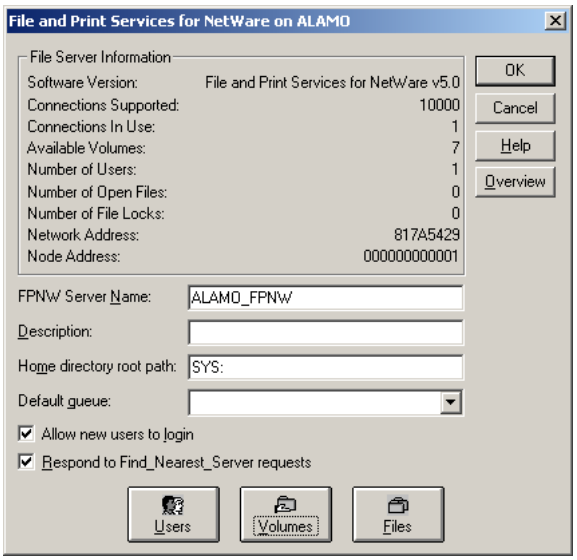


Figure 101: File and Print Services for NetWare screen

2. Enter an **FPNW Server Name** and **Description**.

   This name must be different from the server name used by Windows or LAN Manager-based clients to refer to the server. If you are changing an existing name, the new name will not be effective until you stop and restart **File and Print Services for NetWare**. For example, in Figure 101 the Windows server name is Alamo and the FPNW server name is Alamo_FPNW.

3. Indicate a **Home directory root path**.

   This path is relative to where the Sysvol volume has been installed. This will be the root location for the individual home directories. If the directory specified does not already exist, it must first be created.

4. Click **Users** to:

   See connected users, disconnect users, send broadcast messages to all users connected to the server, and to send a message to a specific user.

5. Click **Volumes** to:

   See users connected to specific volume and to disconnect users from a specific volume.

6. Click **Files** to:

   View open files and close open files.

Creating and Managing NetWare Users

To use Services for NetWare, the Novell clients must be entered as local users on the NAS 2000s.

Adding Local NetWare Users

1. From the NAS 2000s desktop, click the **NAS Management Console** icon, click **Core Operating System**, and then click **Local Users and Groups**.
2. Right-click the **Users** folder and then click **New User**.

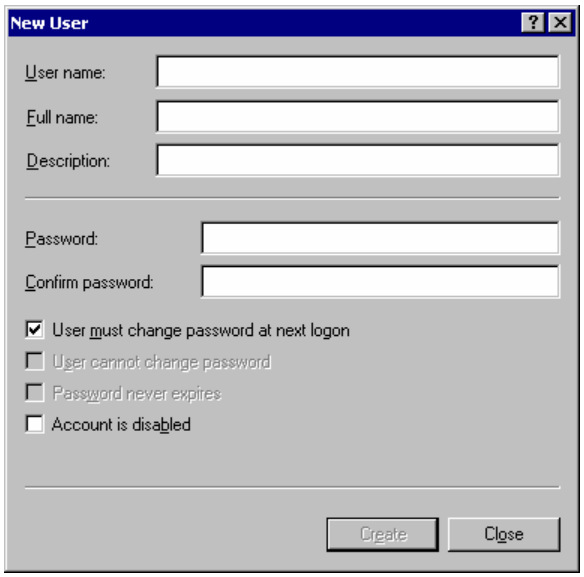


Figure 102: New User dialog box

3. Enter the user information, including the user's User name, Full name, Description, and Password. Click **Create**.
4. Repeat these steps until all NetWare users have been entered.

Enabling Local NetWare User Accounts

1. In the **Users** folder (NMC, Core Operating System, Local Users and Groups), right-click an NCP client listed in the right pane of the screen and then click **Properties**.
2. Select the **NetWare Services** tab.

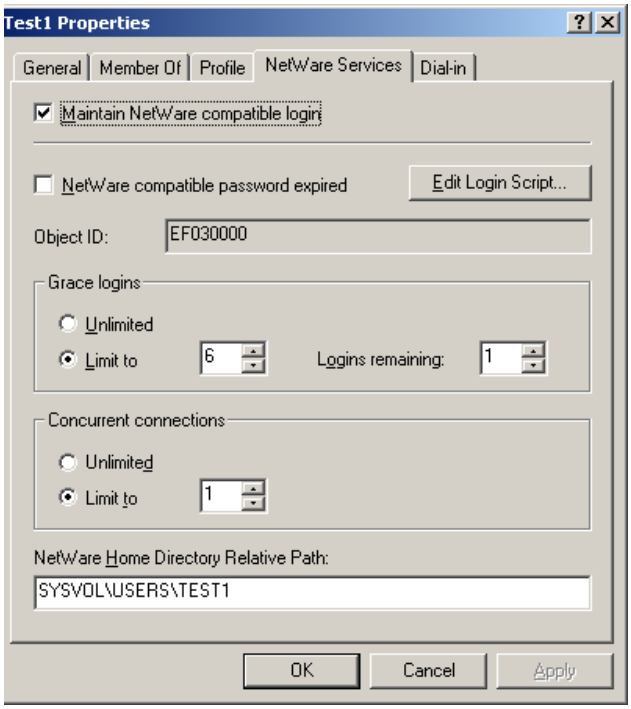


Figure 103: NetWare Services tab

3. Select **Maintain NetWare compatible login**.
4. Set other NetWare options for the user and click **OK**.

Note: The installation of File and Print Services for NetWare will also create a supervisor account, which is used to manage FPNW. The supervisor account is required if the NAS 2000s was added as a bindery object into NDS.

Managing NCP Volumes (Shares)

NCP file shares are created in the same manner as other file shares; however, there are some unique settings. NCP shares can be created and managed using the NAS Management Console.

Note: NCP shares can be created only after Microsoft Services for NetWare is installed. See the previous section "Installing Services for NetWare" for instructions on installing SFN.

Creating a New NCP Share

To create a new file share:

1. From the NAS 2000s desktop, click the **NAS Management Console** icon, click **File Sharing**, **Shared Folders**, and then **Shares**.
2. Right-click **Shares**, and then click **New Share**. The **Create Shared Folder** dialog box is displayed.

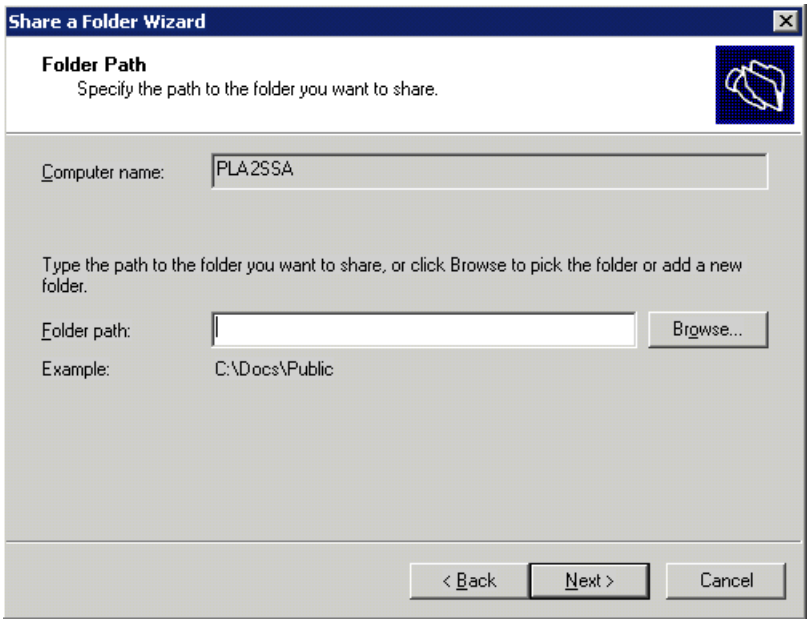
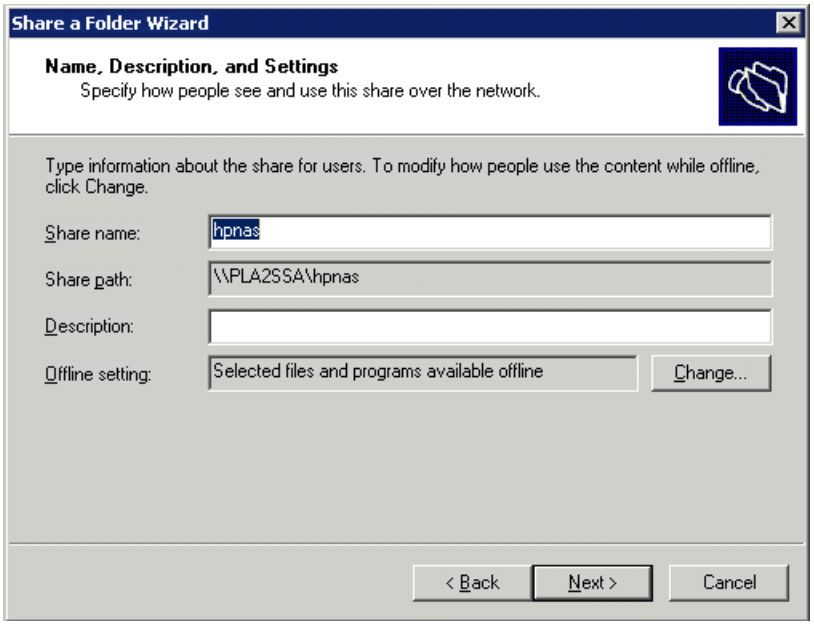

Share a Folder Wizard
Folder Path
Specify the path to the folder you want to share.
Computer name:
PLA2SSA
Type the path to the folder you want to share, or click Browse to pick the folder or add a new folder.
Folder path:
Browse...
Example:
C:\Docs\Public
< Back
Next >
Cancel

Figure 104: Create Shared Folder dialog box

3. In **Folder path**, type the path of the directory to be shared and click **Next**.


Share a Folder Wizard
Name, Description, and Settings
Specify how people see and use this share over the network.
Type information about the share for users. To modify how people use the content while offline, click Change.
Share name:
hpnas
Share path:
\\PLA2SSA\hpnas
Description:
Offline setting:
Selected files and programs available offline
Change...
< Back
Next >
Cancel

4. In **Share Name**, type the name of the share. Users will see this name.
5. In **Description**, type a description for the share. Click **Next**.

6. The dialog box illustrated in Figure 105 is displayed.

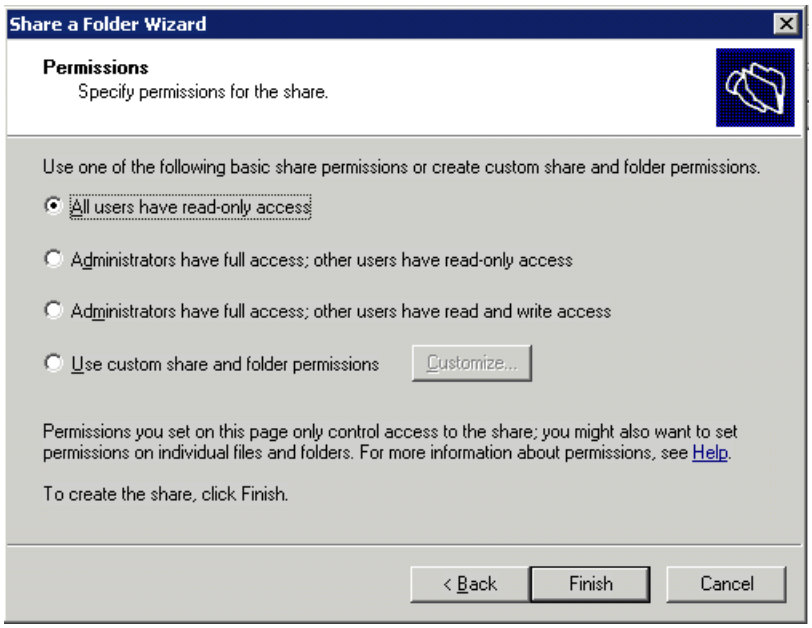

Share a Folder Wizard
Permissions
Specify permissions for the share.
Use one of the following basic share permissions or create custom share and folder permissions.
All users have read-only access
Administrators have full access; other users have read-only access
Administrators have full access; other users have read and write access
Use custom share and folder permissions
Customize...
Permissions you set on this page only control access to the share; you might also want to set permissions on individual files and folders. For more information about permissions, see Help.
To create the share, click Finish.
< Back
Finish
Cancel

Figure 105: NetWare Basic Share Permissions dialog box

7. Select the appropriate permissions level.

   If a custom permissions level is desired, select the **Customize share and folder permissions** radio button and then click **Custom**. The **Customize Permissions** dialog box is displayed. Figure 106 is an illustration of the **Customize Permissions** dialog box.

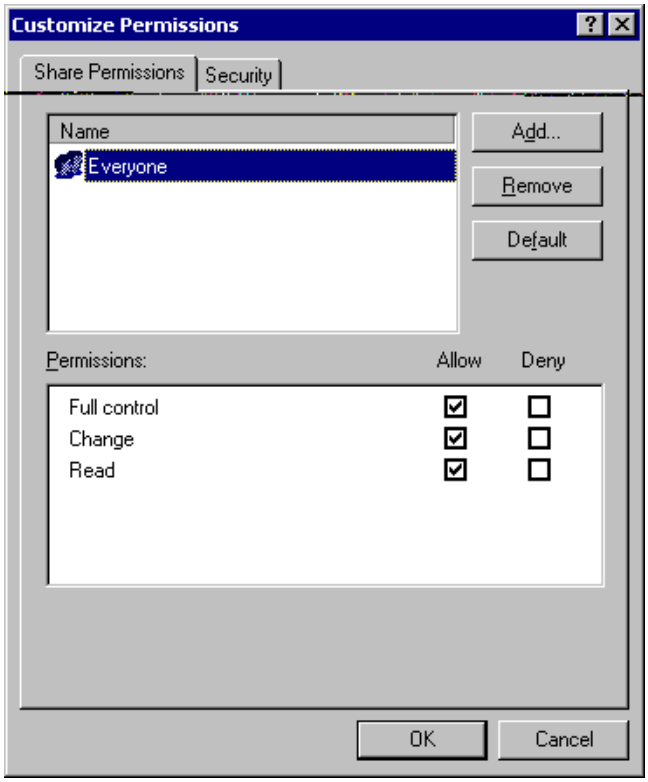


Figure 106: Customize Permissions dialog box, Share Permissions tab

8. In the **Share Permissions** tab, select the appropriate permissions level for each user or group that is configured to have access to that share.
9. To enter file system permissions, select the **Security** tab. The following dialog box is displayed.

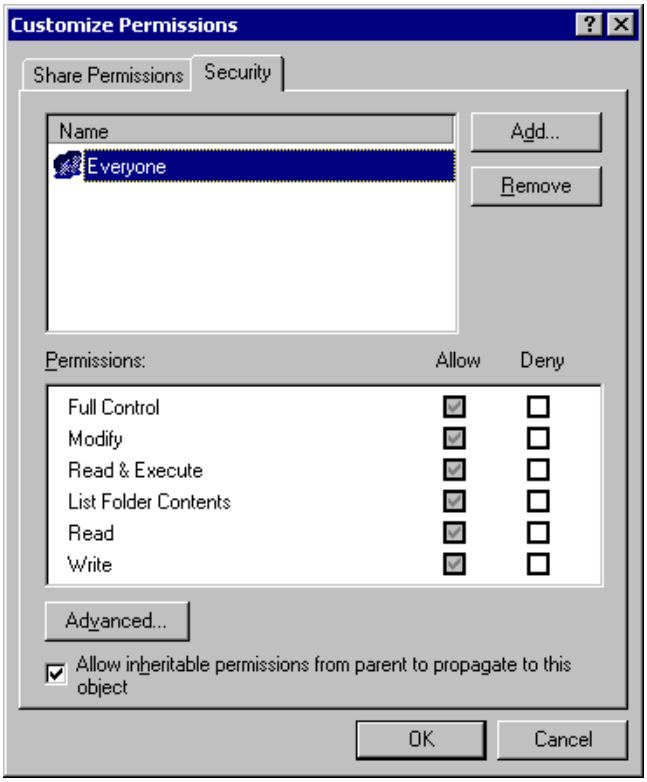


Figure 107: Customize Permissions dialog box, Security tab

10. In the **Security** tab of the **Permissions** dialog box, enter the file system security properties that apply to the share folder on the server.
11. After the permissions have been entered, click **OK** to return to the **Create Shared Folder** screens. Click **Finish** to create the share.
12. To create additional shares, click **Yes** at the "Create another shared folder" prompt. Otherwise, click **No** to exit.

Modifying NCP Share Properties using the NAS Management Console

To change share settings through the NAS Management Console:

1. From the NAS 2000s desktop, select the **NAS Management Console** icon and then select **File Sharing**, **Shared Folders**, and **Shares**.
2. In the details pane, right-click the desired share and then click **Properties**.
3. Click the **Share Permissions** tab.
4. To grant permissions to an additional group or user, click **Add**, select the group or user, and then click **Add**. After any additional groups or users have been added, click **OK**.
5. To change the permissions granted to the group or user, select the desired group or user and then select **Allow** or **Deny** for each item.
6. To remove permissions for the group or user, select the desired group or user and them click **Remove**.

NOTES:

1. Permissions can be set on a shared volume regardless of its type of file system.
2. Share permissions are effective only when the share is accessed over the network.
3. The group of permissions you set for the share applies equally to all files and subdirectories in the volume.
4. Permissions on an NTFS share operate in addition to NTFS permissions set on the directory itself. Share permissions specify the maximum access allowed.

Remote Access Methods and Monitoring

10

The HP StorageWorks NAS 2000s comes from the factory with full remote manageability. Several methods of remote access are provided:

- Web based user interface
- Remote Desktop
- Integrated Lights-Out Port
  - Features
  - Integrated Lights-Out Port Configuration
  - Using the Integrated Lights-Out Port to Access the NAS 2000s
- Telnet Server
  - Enabling Telnet Server
  - Configuring Telnet Server
- Insight Manager
  - Insight Manager Console
  - Insight Manager Agent Web Interface
- Enterprise management applications
  - HP OpenView (Windows-Based Operating System)
  - Tivoli NetView (AIX)

These options let administrators use interfaces with which they are already familiar.

Web Based User Interface

The NAS 2000s includes a Web based user interface (WebUI) for the administrator to remotely manage the machine. Of all of the remote access methods, the WebUI is the most intuitive and easiest to learn and use.

The WebUI permits complete system management, including system configuration, user and group management, shares management, UNIX file system management, and storage management.

To access the WebUI:

1. Launch a Web browser.
2. In the URL field, enter:

   `https://<your NAS b2000 machine name or IP address>:3202/`

Extensive procedural online help is included in the WebUI.

Remote Desktop

The NAS 2000s supports Remote Desktop, with a license for two concurrently running open sessions. Remote Desktop provides the same capabilities as being physically present at the server console.

Use Remote Desktop to access:

- The NAS 2000s desktop
- The NAS Management Console
- A command line interface
- Backup software
- Antivirus programs
- Telnet Server

To access Remote Desktop from the WebUI, select Maintenance, Remote Desktop. For additional procedural information on Remote Desktop, see the “Setup Completion and Basic Administrative Procedures” chapter.

Integrated Lights-Out Port

The following information provides an overview of the Integrated Lights-Out port capabilities. For further information, refer to the *Integrated Lights-Out Port Installation and Users Guide* on the Documentation CD.

The Integrated Lights-Out port is an ASIC-based Web interface that provides remote management for the server.

Regardless of the state of the host operating system or the host CPU, complete capability for the server is available. The Integrated Lights-Out port is independent of the host server and its operating system. The Integrated Lights-Out port provides remote access, sends alerts, and performs other management functions, even when the host server operating system is not responding.

Features

The Integrated Lights-Out port provides the following features:

Note: The remote client console must have a direct browser connection to the Integrated Lights-Out port without passing through a proxy server or firewall.

- Hardware based graphical remote console access
- Remote restart
- Server failure alerting
- Integration with Insight Manager
- Local Area Network (LAN) access through onboard NIC
- Browser support for Internet Explorer 5.50 or later
- Reset and failure sequence replay
- Auto configuration of IP address through domain name system (DNS) or Dynamic Host Configuration Protocol (DHCP)
- Virtual power button

Security Features

- SSL encryption for login and network traffic
- User administration allows capability to define user profiles
- Event generation for invalid login attempts
- Logging of user action in the Event Log

Manage Users Feature

The Manage Users feature allows those with supervisory access to add and delete users or to modify an existing user's configuration. Manage Users also lets the administrator modify:

- User name
- Logon name
- Password
- Simple network management protocol (SNMP) trap IP address
- Receive host OS generated SNMP traps
- Supervisor access
- Logon access
- Remote console access
- Remote server reset access

Manage Alerts Feature

The Manage Alerts feature allows the user to:

- Select alert types received
- Generate a global test alert
- Generate an individual test alert
- Clear pending alerts
- Enable alerts

Refer to the *Integrated Lights-Out Port User Guide* for more information about the Integrated Lights-Out port features and functionality.

Integrated Lights-Out Port Configuration

The Integrated Lights-Out port on the NAS 2000s is initially configured through the Rapid Startup Utility. SNMP is enabled and the Insight Management Agents are preinstalled.

The Integrated Lights-Out port comes with factory default settings, which the administrator can change. Administrators may want to add users, change SNMP trap destinations, or change networking settings. Refer to the *Integrated Lights-Out Port User Guide* for information about changing these settings.

There are several methods for performing Integrated Lights-Out port configuration changes:

- Web interface
- Integrated Lights-Out port configuration utility accessed by pressing **F8** during a system restart.

Note: You must connect locally with a monitor, keyboard, and mouse to utilize the F8 feature.

- Integrated Lights-Out port access using the default DNS name

Using the Integrated Lights-Out Port to Access the NAS 2000s

Using the Web interface of a client machine is the recommended procedure for remotely accessing the server:

1. In the URL field of the Web browser, enter the IP address of the Integrated Lights-Out port.

Note: The iLO port can also be accessed from the HP Utilities tab of the WebUI by clicking the remote management link.

2. At the Integrated Lights-Out Account Login screen, supply the username and password for the iLO and click **Login**.
3. Click the Remote Console tab. The Remote Console Information screen is displayed.
4. Click on the Remote Console choice in the menu on the left side of the screen.
5. Press **Ctrl-Alt-Del** to login to the console.
6. Supply an administrator username and password. The NAS server desktop is displayed.

Note: The remote desktop feature of the iLO port requires a license key. The key is included with the product inside the Country Kit. See the iLO Advanced License Pack for activation instructions.

Telnet Server

Telnet Server is a utility that lets users connect to machines, log on, and obtain a command prompt remotely. Telnet Server is preinstalled on the NAS 2000s, but must be activated before use.

Caution: For security reasons, the Telnet Server service must be restarted each time the server is restarted.

Enabling Telnet Server

Telnet Server can be enabled in two ways. The first is to use Remote Desktop to access a command line interface and enter the following command:

```
net start tlntsvr
```

The Telnet Server service needs to be enabled prior to running this command. The service can be enabled by opening the services MMC:

1. Select Start, Run, then type services.msc.
2. Locate the Telnet service, right-click on it, then select **Properties**.
3. In the startup type drop-down box, choose **Manual**, and click **OK**.

The second is to open the WebUI:

1. Click **Network**.
2. Click **Telnet**.
3. Check the **Enable Telnet access to this appliance** box.
4. Click **OK**.

Sessions Information

The sessions screen provides the ability to view or terminate active sessions.

HP Insight Manager Version 7

The NAS 2000s is equipped with the latest Insight Management Agents for Servers, allowing easy manageability of the server through HP System Management, HP OpenView, and Tivoli NetView.

Insight Manager is a comprehensive management tool that monitors and controls the operation of HP servers and clients. HP Insight Manager Version 7.0 or later is needed to successfully manage the NAS 2000s using the following components:

- Windows-based console application available on the Insight Manager 7 CD-ROM loaded on a separate client for NAS devices
- Server or client based management data collection agents

Management agents monitor over 1,000 management parameters. Key subsystems make health, configuration, and performance data available to the agent software. The agents act upon that data by initiating alarms in the event of faults. The agents also provide updated management information, such as network interface or storage subsystem performance statistics.

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